THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXIV. No. 1899.] LONDON, OCTOBER 3, 1899. [51ST YEAR. PRICE 6d.

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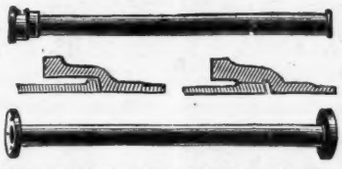

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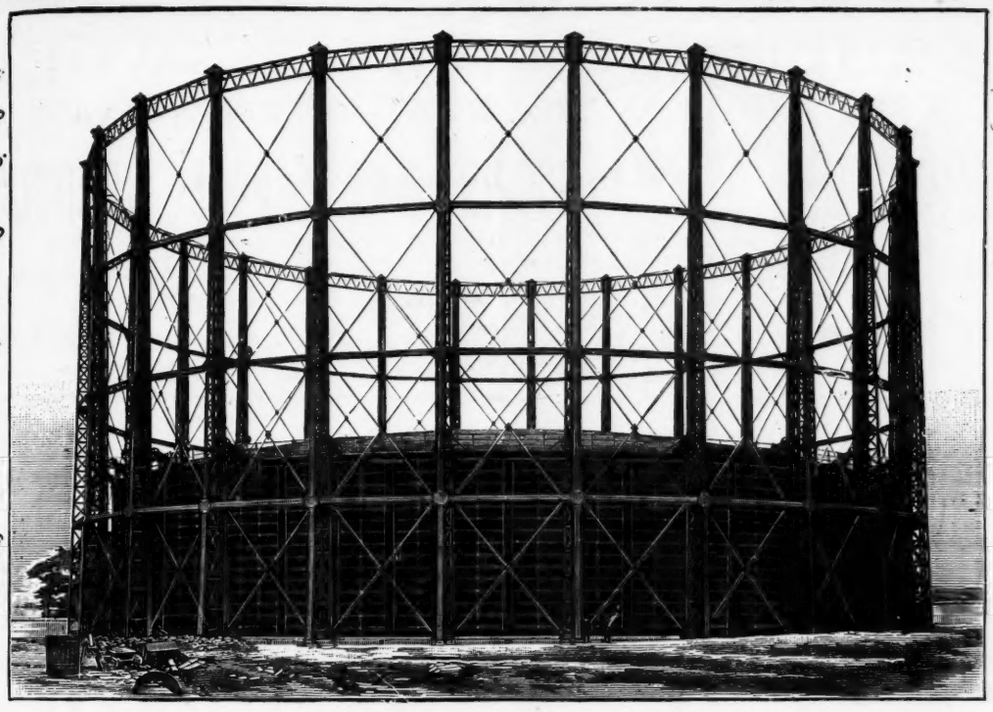

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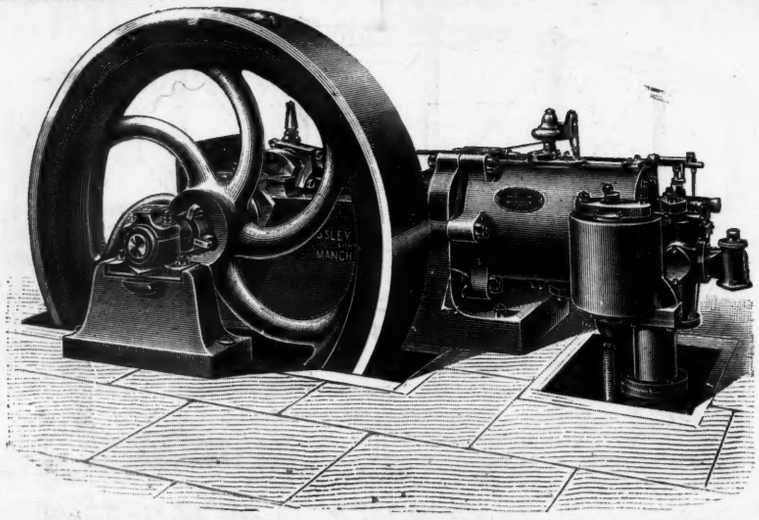

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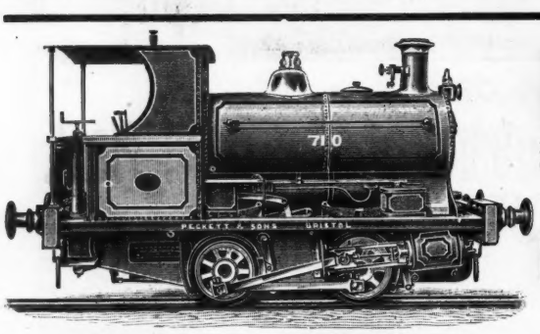

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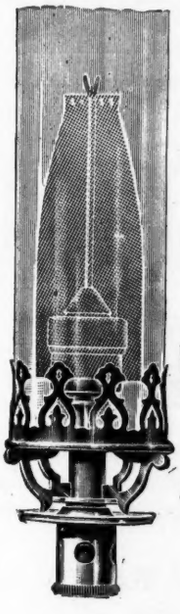

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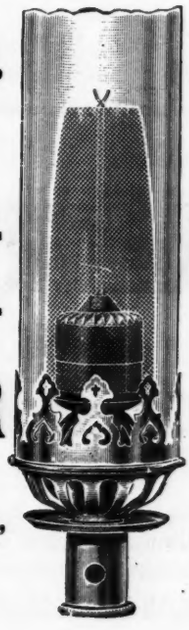

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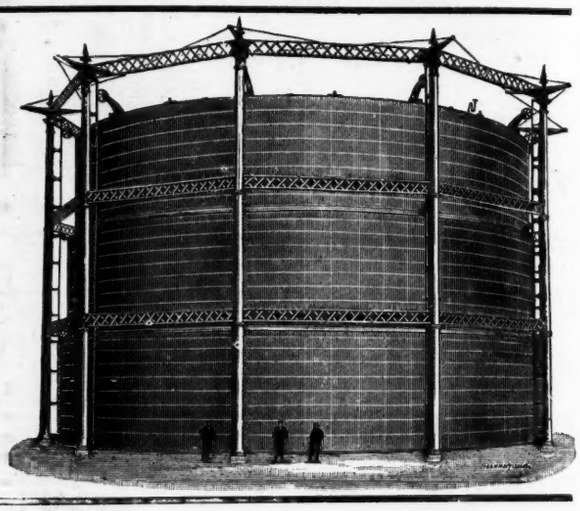

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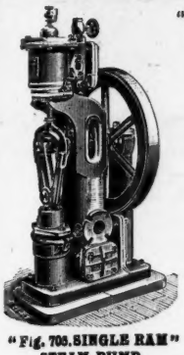

"Fig. 709. SINGLE RAM" STEAM-PUMP.

Fig. 566. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

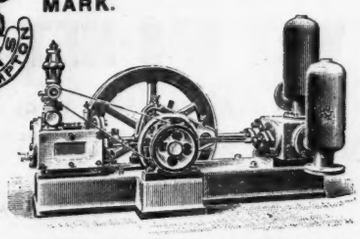

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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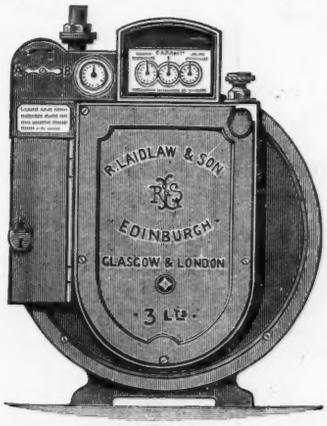

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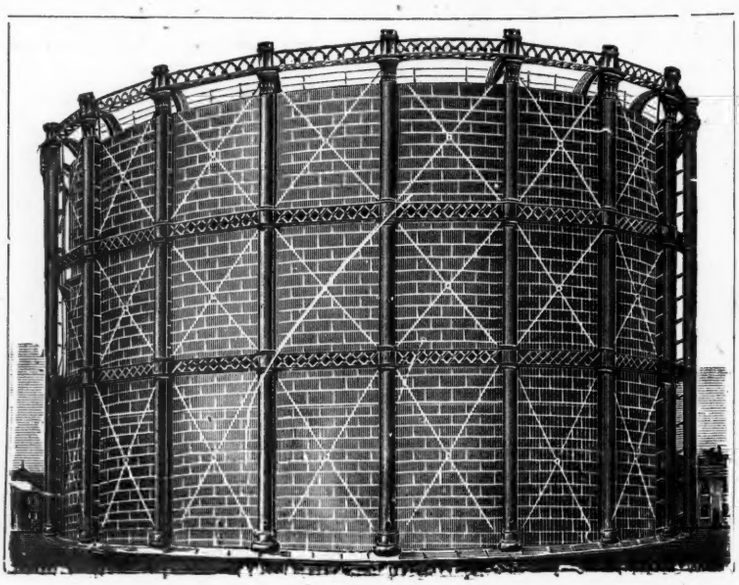

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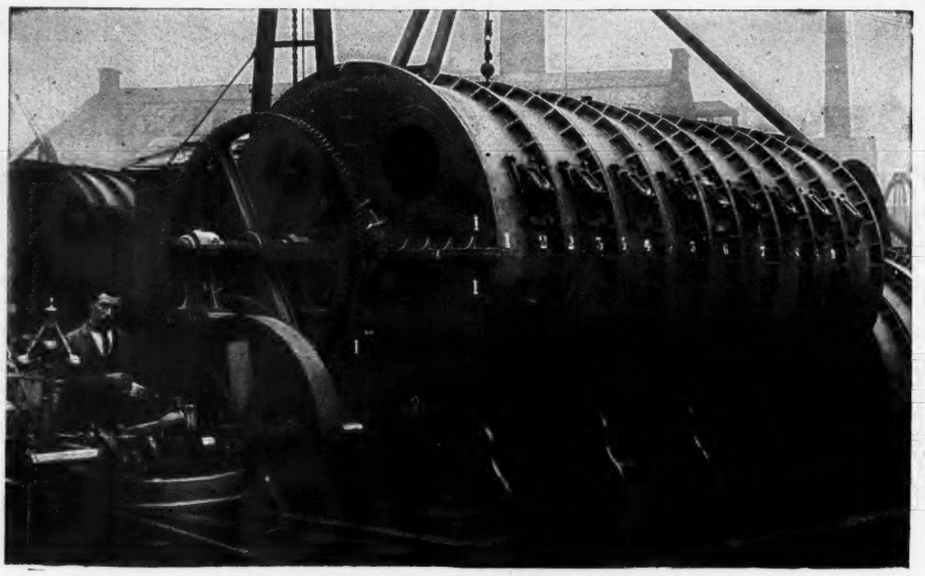

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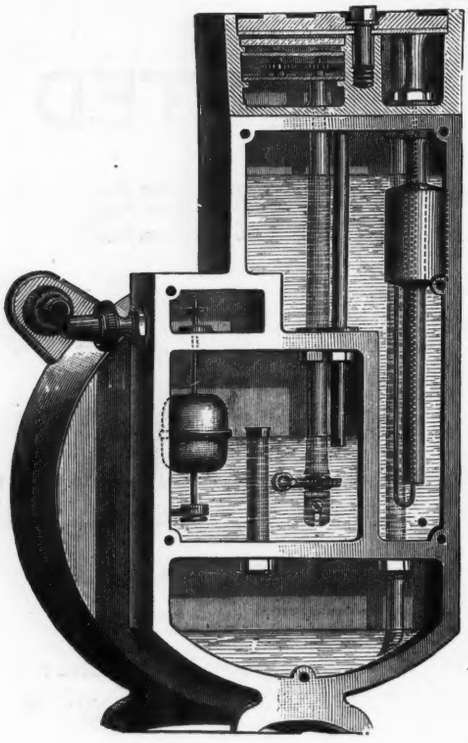

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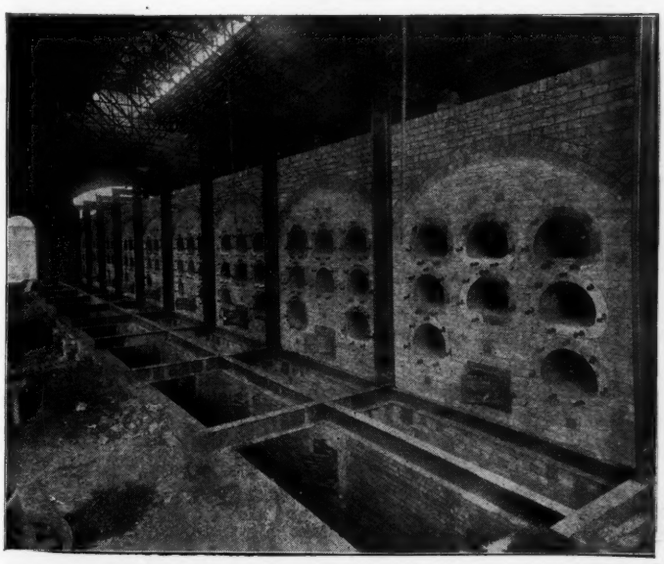

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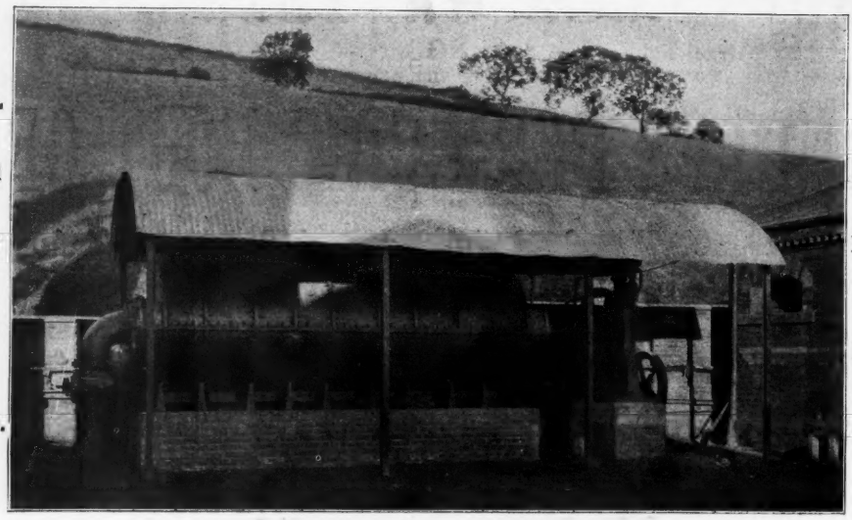

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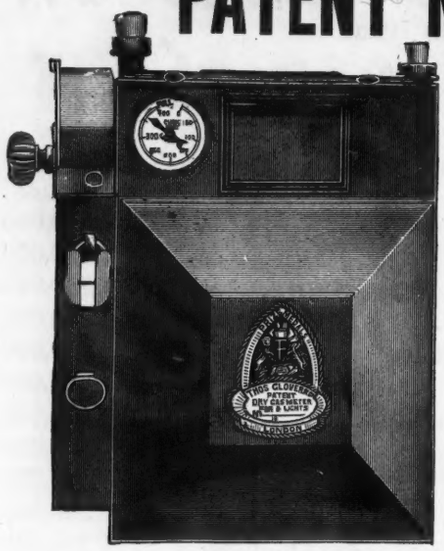

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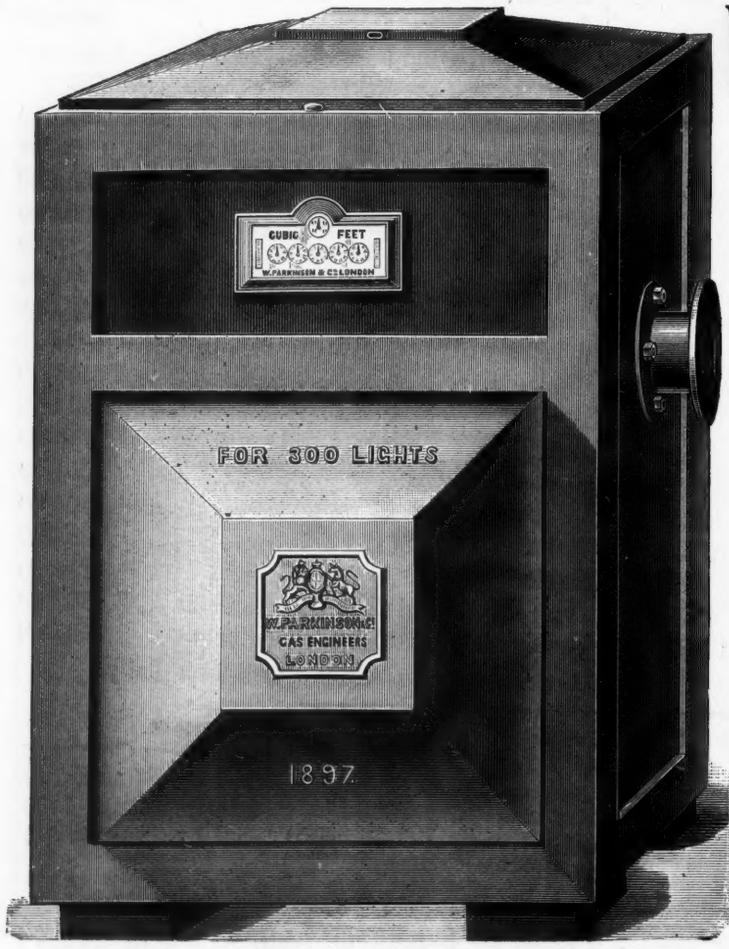

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EDITORIAL NOTES.

The Work of the British Association Meeting.

THE British Association meeting at Dover was chiefly distinguished by the high character of all the Presidential Addresses. It was one of the smallest of recent times, in point of attendance; and it is interesting to those who are concerned with the conduct of similar assemblages, though on a narrower basis, to learn that this circumstance is explained by the absence of the usual tribe of "camp "followers" of the Association who are mostly attracted by the excursions. Dover offered less than the usual inducements to the frivolous people who make choice of the Association meetings as an opportunity for playing at being scientific. Still, the severe work of the meeting was very pleasingly diversified by sports and pastimes. We have laid aside the reported proceedings for study at leisure. The address of the President of the Chemistry Section (Dr. Horace T. Brown) is emphatically one of those compositions which "give to think," as the French say. It dealt with the fixation of carbon by plants, and therefore went behind the usual starting-point of those who begin their observations upon coal with the recognition that it is a product of vegetation. How did the plants which formed coal get their carbon? Where did the carbon come from? This is going into the nature of things, indeed. The same may be said of the discourse of Professor J. H. Poynting to the Mathematical and Physical Science Section; and of the address of Sir A. Geikie to the geologists. Amid much that is pedantry, and not a little that is sheer self-advertisement in connection with these gatherings, it is a compensation to know that the Presidential Addresses can usually be implicitly relied upon to show the actual "time of day" with the sciences to which they refer. The Section of Economics and Statistics is always one of the most interesting of the whole collection. To judge from the address of the President (Mr. Henry Higgs), the spinning of economic theories has for the time being ceased to interest professed economists, who are turning their attention more particularly to the facts of wealth making and dispersing; and in so doing they are wise. The most pressing problem for British economists at the present moment is that of the expediency of municipal trading; and it is rather amusing to us to see the professors and neophytes of this science fastening, as upon a novelty, on questions concerning municipal gas profits and so forth, which have been debated by our readers for years.

The fashion of "Progressivism" in municipal politics is responsible for putting the edge to this question. Municipalities made gas and water profits in England, and abjured them in Scotland, long before the Progressive politicians of our day went into business. This does not prevent the Editor of the "Municipal Journal" reading a paper at Dover to tell the world all about the advantages of the municipalization of gas, water, and electricity supply. He said that "Municipalities, as a rule, supplied gas of a "higher illuminating power than Companies, and at a lower "price." Quite true; but he did not explain that the illuminating power of gas in Great Britain is chiefly a question of locality; so that it would have been better to have said that it was the higher illuminating gas supplies that, as a rule, had been municipalized. Neither did he state that Municipalities have a liking for testing their own gas. As to relative cheapness? Well, that is a matter that cannot be dismissed in a sentence, as those know well who know anything whatever about it. The paper was a very fair exercise; but it did not really carry the study of the subject much farther. Mr. Laurence Gomme, the Statistical Officer of the London County Council, in the course of the discussion, tried to draw a distinction between municipal enterprise and municipal trading; and he laid stress upon the real difference between taxation and commercial charges. It is, however, very difficult to make hard-and-fast rules in such matters, which are so largely governed by expediency. The "Manchester Gaurdian," we observe, dismisses the question of the desirability of making a profit out of municipal gas, by declaring that, "inasmuch as the users of "gas and the community are practically identical, no hard-"ship is involved." Yet we seem to have heard something of the hardship of out-townships helping to pay Manchester rates in the shape of gas charges! The process of municipalizing gas supply in the United Kingdom is practically now completed; for nobody was able to tell the British

Association what would be the advantage of municipalizing a sliding-scale company. It is different with electricity supply and tramway working; but these are branches of the inquiry that cannot be entered upon here.

The Public Health Congress.

It is a little difficult to keep track of all the scientific and technical congresses for which this country provides meeting places at this season of the year. These organizations, moreover, have many points of contact, not to say of overlapping; so that one is puzzled to know why some papers go to one, and others elsewhere. Thus, the congress of the Sanitary Institute was barely over when the British Association meeting began; and this latter has clashed with the congress of the Royal Institute of Public Health. At all these gatherings papers were read, discussions held, and addresses delivered on similar topics. It is not our fault, therefore, if in noticing these congresses we seem to repeatedly travel over the same ground. At the Health Congress, which met at Blackpool, the Town Clerk of this lively town, who presided over the Municipal Section, expressed strong views as to the right of Local Authorities to do their own general public work. He complained bitterly that, while the expediency of this policy is admitted, the necessity of applying to Parliament for executive powers in every instance involves the large expenditure of public money. As we understand Mr. Loftos's point, it is that the Borough Funds Act is a costly, vexatious, and useless obstacle intervening between the intentions of Parliament as expressed in so-called enabling Acts, and the desire of many Local Authorities to take advantage of these statutes. The Borough Funds Act is itself styled an enabling Act; but this is a misnomer. There is a good deal in Mr. Loftos's argument; but he confesses the difficulty of suggesting an alternative procedure.

Mr. J. Beckett, the Borough Accountant of Accrington, read a thoughtful paper on "Local Indebtedness," which we reproduce almost in full, as it forms a pointed commentary on Dr. Blake Odgers's views of the subject. We agree with Mr. Beckett in objecting to the usual vague and general criticism of local indebtedness, and also to the official way of comparing its amount with that of the National Debt. As Mr. Beckett truly remarks, the two things have nothing in common. At the same time, it must be conceded that there ought to be some standard of soundness for local finance. Extravagance and backwardness are both possible with regard to making provision for local wants; and the spending authorities should have some guide to show them what they can and cannot afford. Unfortunately, it is easier to lay down this proposition than to realize it. Mr. Beckett does not answer the questions he himself raises. The objects of municipal expenditure are so various, and local conditions differ so much, that anything like a general rule is probably impossible. Mr. Beckett's examination of the subject comes round at last to the discovery of something which he had in mind from the start—that the period now exacted for the redemption of Local Authorities' loans is usually too short, and determined by too arbitrary a rule. He thinks that some regard should be had, in fixing time-limits, to the duration and serviceableness of public undertakings. It is to be regretted that he complicated his case by arguing that a sinking fund is only another name for a depreciation allowance. Having fallen into this heresy, he made matters worse by declaring that no private owner, however prudent, and in whatsoever prosperous times, taxes himself to this degree. Now, a sinking fund usually takes from 1 to 1½ per cent. of the amount of a municipal loan. A private owner does not form such a fund—in the case of a gas undertaking it is not permitted—but he takes care to adequately depreciate the more perishable part of his property and plant before declaring his net profit. Here is where the municipal shoe pinches: The Municipality is expected both to pay interest on and redeem capital, and also keep up the value of the undertaking as a going concern. If a sinking fund is an adequate depreciation allowance also, as Mr. Beckett says, then it follows that the concern may stop, the moment the last instalment of debt is paid off, which can hardly be his view. But why should the realizable capital value of reproductive municipal undertakings ever be paid off at all? Why include such properties in the same category as street paving and main drainage? This seems to be the real question. Because if it is understood that the interest on the capital, the cost of redeeming it, depreciation, and upkeep, must all be provided for out of the revenue derivable from municipalized enterprises, this principle (of municipalization) cannot often be an improvement, from the consumers' point of view, on private trading.

Before the Chemical and Meteorological Section of the Congress, presided over by Mr. A. E. Fletcher, the never-exhausted subject of smoke prevention was discussed again. As Dr. Graham observed in his paper on the smoke nuisance, this trouble came with the steam-engine early in the century, although it was recognized long before in connection with the adoption of coal for fuel. Still, it is an undeniable fact that the nuisance is greater in manufacturing towns than in purely residential ones; and it is equally true that a good deal of the factory smoke of most towns might be prevented. What is wanted more than anything else, in order to grapple effectually with this evil, is an active and instructed public opinion. Every association of influential citizens that sets itself to manufacture and properly direct this public opinion deserves well of the community.

The Report and Accounts of the Commercial Gas Company.

The report and accounts of the Commercial Gas Company for the half year ending last Midsummer will be found in another column. The ordinary general meeting will be held on Thursday. The report states that the net profit on the revenue account for the half year amounts to £53,549. Adding interest and the carry-forward, the profit balance is £55,719. Deducting the debenture stock interest, there remains available for dividend a balance of £50,428. Last year the amount stood at £49,189. The Directors will recommend the usual dividends of 13½ and 10½ per cent. on the old and new stocks respectively. The finances of this undertaking preserve the even tenor of their way. The capital powers of the Company are being eked out with the most careful husbandry; but they will not last for ever. The consumption of gas in the Company's district is still on the increase. The rental for the half year amounted to £154,956, as compared with £151,616 for the corresponding half of last year. The revenue from other sources has improved, but not so much as might have been expected, owing to a positive falling off in the return from coke. The gross revenue rose from £191,748 to £199,012, or by £7264. On the other side of the account, the expenditure has risen from £137,789 to £145,463; so that the balance carried forward is a few hundreds less—£53,549, as compared with £53,958. Increased cost of gas manufacturing materials is the reason for this; the other entries being much the same as usual. "Oil-gas manufac-" ture" now bulks largely in the working statement, which is evidently the reason why there is less coke for sale. To end the half year with 70 tons of coke only in store, must be a "record" for a Metropolitan Gas Company. The address of the Chairman of the Company to the meeting can scarcely be of a sensational character; but the consideration of when the Company had better go to Parliament, and what treatment is likely to be meted out to them there, must begin to weigh upon the private councils of the Directors, if it does not find expression in their public utterances. Mr. Gill will be expected, also, to say something about the recent parliamentary inquiry.

The Good Fortune of Leicester.

During the last week or two, the results of the municipal working of the Leicester gas supply, which has just marked its "majority," have been conspicuously flaunted in the newspapers. We gave in the last issue of the "Journal" some statistics pertinent to the occasion; and in another column will be found a notice of the proceedings at the quarterly meeting of the Town Council on Tuesday, at which the reports of the Corporation Gas and Electric Lighting Committees were adopted. While fully recognizing the ability and devotion of Alderman Lennard and the members of the Committees, and congratulating Leicester upon the result of its civic ventures in gas and electricity supply, it is only right to take exception to the use of this success as a support for the fashionable craze for municipalizing undertakings of this kind. Before crediting municipal administration with all this good result, one may ask how much of it is due to the "unearned increment" of business expansion owing to the prosperity of the town itself. In the person of their Gas Engineer (Mr. Alfred Colson), the Leicester Corporation also had the good fortune to find the very man for their work. It might have been different. Somebody, apparently galled at the advertised triumph

of Municipalism at Leicester, has written to "The Times" to ask what would have happened in the meantime if the gas-works had remained private property. It is difficult to say; but, assuming the same excellent management to have been available, the price of gas would probably have been less than it is to-day. This reflection raises the old problem of subsidies in aid of rates *versus* the cheapest possible gas. Not even Municipalism can eat its cake and have it. Having the power to fix their own price for gas, the Corporation can make as much "profit" as they like, or as their sense of what is due to the consumers permits. The ground of the Leicester success in gas administration is nothing very wonderful. It lies in the conditions of a fast-growing district, to begin with; and the best of management to go on with. The Gas Committee, having the wit to see that they had a first-class Engineer and Manager, had the greater wisdom to make good use of him. Mr. Colson, at Leicester, is the right man in the right place. He has good scope, in the rapid growth of the undertaking; and he is fully equal to his opportunities. It is not his business how the Corporation dispose of the gas "profits." Not Municipalism, nor the company system, nor individual ownership can be sure of always commanding such a combination. In a stagnant undertaking, neither Mr. Colson nor anybody else could effect very much. If harried and worried by a hide-bound oligarchy, the Leicester Executive would have failed to do itself justice. As it is, Leicester may be thankful for its lot as regards gas supply; and before this is put to the credit of Municipalism or any other abstract principle, let due allowance be made for the good men who have had the anxiety and labour of it all these long years.

The Outlook in South Wales.

THE trouble which most immediately threatened a crisis in the Welsh coalfields when we last referred to the situation there, has, we are glad to say, been averted—only, however, by a concession of higher wages to the men. Writing a fortnight ago, we referred to the fact that the enginemen, stokers, and fitters in the Monmouthshire, Merthyr, and Dowlais districts had given notice to cease work at the end of September, and that a conference between them and their employers had proved abortive owing to the refusal of the men to withdraw or suspend those notices as a condition precedent to a discussion of rates of pay. Yesterday week, however, the conference was, at the instance of the men, resumed; and, after a prolonged discussion, the representatives of the men (in spite of a vote of their constituents adverse to such action) agreed to suspend their notices until the 31st inst., on the understanding that the employers would forthwith submit an amended schedule of wages for consideration by the men. Such a revised scale was immediately handed in by the employers; and it is now reported that increases varying from 4d. to 8d. a day have been agreed upon.

A strike which would have affected some 20,000 miners is, therefore, happily averted. We cannot, however, help wondering whether, if the circumstances of trade had been reversed, the men would have agreed to accept a corresponding decrease in wages. It is the absence of any sufficient guarantee that men will be content to give as well as take, that largely accounts for the unwillingness of employers to grant an advance of wages in times of prosperity. The tendency to regard such enhanced rates of pay as an irreducible minimum, not unreasonably makes employers chary of granting a temporarily, but possibly not permanently, justified increase. It will be observed that, in the case in point, the men's representatives had to disregard their instructions in order to effect a settlement. What chance of acceptance would that settlement have had if it had involved a fall, instead of a rise, in wages? It is just the fact that the sliding-scale system of adjusting rates of pay involves the obviously fair principle of give and take, that constitutes its chief objection in the eyes of the men—an objection that, however, only makes itself apparent when they are called upon to "give"—and renders easy the task of the Federation leaders, of undermining the system in Wales. The vital objection to a sliding-scale entertained by Union leaders is that, where such a system is in vogue, there is no employment whatever for them.

Mr. W. Abraham, M.P., is most virtuously indignant at the suggestion that the Federation would welcome an early opportunity of "going for" the sliding-scale. In a long, but somewhat incoherent, communication to the "South Wales Daily News," entitled "Is a Coal Trade "Crisis Impending?—Wild Rumours Refuted. By 'Mabon,' "M.P.," he characterizes a suggestion, made in the "Shipping World," that the leaders of the miners in South Wales have in view an early "attack in line" upon the settlement of last year and the sliding-scale in principle, as the "unwarranted deductions" of an "unscrupulous "writer;" and he boldly declares that all existing disputes are only those "incident to all great industries," and are not indications of a general campaign. This declaration is, however, somewhat discounted by a subsequent statement in the same article that, "during the lifetime of the "sliding-scale, the men will be guilty of no unconstitu-"tional action that they are not driven to by the other "side. . . . But when the proper time comes, there is "not the slightest doubt that they will take constitutional "means of bringing the sliding-scale to an end, and have "it replaced by a Conciliation Board." Is it an "unwar-"ranted deduction" to say that this spells breakers ahead? What everyone will want to know is, how much "driving" by the other side will be necessary to produce "unconsti-"tutional action" by the men? "Mabon," if his recent perversion from the sliding-scale has not lessened his influence with the men, will, we suppose, be the judge; and we know that the condition of peace that he requires is for the employers to be in the same frame of mind as the men. While, therefore, hoping for the best, one cannot but await with some anxiety the outcome of the present condition of unrest in South Wales, and especially the result of a turn in the tide of trade. That will be the time when the bearing strain of the sliding-scale will be put to its severest test.

A True Engineer.

THE regretted death of Mr. Edward Case, of Romney Marsh, during the Dover meeting of the British Association, at which he was to have read a paper descriptive of his system of groyning for the protection of eroded sea-shores, suggests some reflections on the essential quality of the science called engineering, of which he was a shining examplar. The teaching and profession of engineering are often discussed; and, as everybody knows, on the European Continent such very exact ideas on the subject prevail, that certificated engineers are a regular product of the Universities. No man who is not certificated is entitled to call himself an engineer; and, conversely, nobody dare question the engineering ability of a duly certificated man. Looked into more closely, the engineering in this case resolves itself into knowledge of a system of applied mathematics—into something, that is, which can be made into a college course. This interpretation of engineering has spread, to some extent, from the countries of its origin to England and the United States. We now have graduates in engineering, with paper credentials and a reference to college training. This is all very good and strictly proper. Engineering is so exacting and far reaching, that the ablest of the men who follow it cannot know too much. All other things being equal, the fuller his equipment, the better he will do his work. But—and this is the gist of the whole matter—no amount of instruction or training will make a real live engineer. What is called engineering science is, after all, but the tool for the man to use. An engineer, in the proper sense of the term, is a man who can do what is wanted with natural forces, to the best effect, with the means at his command. Engineering is an art, as much as it is a science. The science is one thing; the art of applying it properly is the greater thing. This has oftentimes been exemplified in connection with the gas industry; but, in order to avoid personalities, we prefer to illustrate the lesson by the example of Mr. Case. He was the man of his hour. Ten years ago the encroachment of the sea at a particular part of the Kentish coast appeared to be irresistible. From 1872 to 1890, the low-water mark in these regions had advanced 400 feet, although £70,000 had been spent upon the maintenance of the sea-wall. Mr. Case advised a system of groyning the foreshore, which was rejected. After £20,000 had been spent to no avail on the old plan of walling, the authorities left the problem in Mr. Case's hands. The foreshore is now protected by groynes having a total length of ten miles; and the accumulation of shingle has thrown back the low-water mark beyond the limit in 1872. The point of the record is this: Engineering knowledge would indicate the scantlings and method of

constructing these groynes; but the prescription of the principle is engineering itself. It is the ability to select the right expedient which is unteachable and innate, and must ever constitute the real credential of the Engineer.

Seven Ears upon One Stalk.

We publish elsewhere a short abstract of a recently issued report of the Labour Department of the Board of Trade, containing full details of the changes in wages and hours of labour recorded during 1898, together with a summary of the preliminary figures for the first half of the present year. The report, taken in conjunction with the official Revenue and Trade Returns, affords abundant evidence of the fact that we are at present enjoying a period of great and almost unexampled prosperity, and is, in many respects, eminently satisfactory reading. So far as the gas industry is concerned, that satisfaction must, we fear, be of a somewhat qualified character. As citizens of our country, we must rejoice in its continued and increasing prosperity; and gas managers, as employers, may well be pleased to note—what is one of the most satisfactory features of the report—that, while somewhat over a million workmen received an increase in their wages last year, 95 per cent. of the number obtained their rise by other means than that of striking. Some 78 per cent. secured the concession by direct negotiation with their employers, the other 17 per cent. automatically by virtue of a sliding-scale. That is, of course, as we have said, a matter for considerable satisfaction; but too great hopes of future industrial peace should not be built thereon. We observe that "The "Times," commenting on this feature of the past year's record, therein finds "reason to hope that the evils inci- "dental to strikes, and the ordinary tactics of the 'labour "'leaders', are beginning to be understood by the mem- "bers of the artisan class, and that they will be prepared, "whenever the inevitable period of temporary depression "may arrive, to recognize that they cannot displace its "entire burden from their shoulders to those of others."

Gladly as we would share in that expectation, and willing as we are to believe that the working classes are beginning in some small measure to understand the folly of certain of their leaders, we are afraid that the facts do not warrant so large a conclusion as that drawn by our contemporary. It appears to us that the almost entire absence of friction which characterized the adjustments of wages last year resulted rather from the willingness of masters to grant reasonable advances—a willingness induced by the almost universal "boom" in trade—than to an access of "sweet- "ness and light" to the counsels of the men. That the foolishness of a policy of "nag and strike" will, with improving education, become increasingly obvious to the working classes, we may and do hope, but the time is not yet; and we shall not be surprised—greatly as we should regret—to see a recrudescence of unprofitable agitations and strikes so soon as the lean kine begin to devour the fat-fleshed and well-favoured. A further consideration that prevents us from cherishing too fondly the hope that the working classes will acquiesce quietly in a reduction of wages when the inevitable period of depression succeeds, is the fact that increases obtained in a time of active trade are not, in the majority of cases, looked upon as abnormal, and put by for a rainy day, but are expended on increased comforts and pleasures, and tend to raise the standard of the "necessities" of life. We all know how much easier it is to dispose of an expanded income than to "draw in" to meet a loss. Frankly, it is scarcely to be expected of human nature to accept a fall in wages without protest.

Whatever, though, the future may have in store—and we do not wish to be unduly pessimistic—the present is, without a doubt, a time of great national prosperity. Beyond a patriotic sense of satisfaction, however, gas managers cannot, in the nature of things, be expected to rejoice at the present state of trade and the labour market, especially when it is borne in mind that a very large proportion of the recorded increase in wages is accounted for by activity in the engineering, iron, and steel industries, and, most of all, in the coal trade. Active trade means high prices for the raw materials required for gas manufacture; and high wages in certain trades, with a good demand for labour, creates a demand for higher wages all round. This made itself felt in the gas industry last year, and increases are recorded as having been granted to 7489 gas workers, of whom 6624 were employed in London. With coal, iron, and wages ruling high, the gas manager has to fight hard to keep his price down and his dividend up. His great hope lies in a compensating market for residuals; and, at present, we are glad to say, that market is standing him in good stead. Coke, tar, and sulphate are all going well; the one white elephant that remains is anthracene. Will the rising tide lift that before it turns?

WATER AND SANITARY AFFAIRS.

It was intimated in the last issue of the "Journal" that the subject of the storage of flood waters might possibly come into prominence before next session. Signs are not wanting that some action will be taken to impound and systematically utilize water which is admitted, after proper treatment, to be fit for ordinary domestic purposes, but which now runs to waste; though it would be useless to speculate as to the quarter in which the initiative will be taken. This matter may therefore be left to shape itself as time goes on. Professor Robinson did well to direct the attention of the Sanitary Institute to it in the paper we gave a fortnight ago; and they are not likely to let it drop. Another question brought before them was the control of watershed areas, which was dealt with in a paper by Major Lamorock Flower, the Sanitary Engineer to the Lea Conservancy Board. It had, however, been previously discussed by the British Association of Water-Works Engineers, who some time ago appointed a Special Committee to consider the subject; and their report, it may be remembered, came before the members at their annual meeting in June. It was short, but very much to the point, for it set forth the opinion that, in the public interest, it was essential that the water supply of the United Kingdom should be under the control and supervision of some "independent, duly authorized, and pro- "perly qualified body or department." Five weighty reasons were given in support of this opinion; and they were unanimously accepted by the meeting. As copies of the resolution were to be sent to the Home Secretary and the Presidents of the Local Government Board and the Board of Trade, and also circulated all over the country, the action of the Association is pretty certain to bear good fruit. It is not likely that so important a resolution would be "pigeon-holed," although at the time it was passed the Government, as we then remarked, had their hands rather full of water questions. Some of these, however, have now been settled; and, colonial political complications notwithstanding, opportunity may be found for taking up a question which is of great importance in connection with the internal government of the country. When referring to this matter a few months ago we suggested that the Association should back up their circular by a deputation to the President of the Local Government Board; and it may not be out of place to repeat the suggestion at the present juncture, when plans are being laid down for the work of next session.

Assuming that the Association will be able to obtain a hearing at the Local Government Board, they will have some strong points to submit to the President. They will urge, in the terms of their resolution, that water supply, being of national importance, should be under national control; local control depending too largely upon the varying constitution of the local bodies administering the supplies. This objection, by the way, would be equally applicable to the London County Council if they were entrusted with the management of the water supply of the Metropolis. The triennial election of that body might cause such changes in its constitution as to seriously interfere with the carrying out of a settled policy such as that which should govern a water undertaking. The next point to be brought forward by the Association will relate to the available sources of supply; and they will urge that at present there is a want of combination which is highly desirable in order that those sources may be utilized in the best and most economical manner possible. A good deal may be said in support of this statement. Two or three large corporations may be striving to secure a watershed area in which some of the smaller authorities are interested; and, under such circumstances, it is a question, as was pointed out by Mr. C. E. Jones at the last meeting of the Association, and also by Mr. J. Lemon at the congress of the Sanitary Institute, of "first come first served," and the longest purse securing the prize. The arguments adduced on this point will apply equally to the next one—

viz., that there is an immediate necessity for dealing with the allocation of gathering-grounds on a comprehensive and equitable basis, "independent of local and other selfish "interests." Finally, attention will be called to the position of the smaller authorities in the contest, and it will be shown clearly that they cannot, except at prohibitive cost, sufficiently protect the interests of the communities dependent upon them for their supply of water. What is wanted by the Association is the constitution of a National Board, who would deal with all these matters, and, as Mr. Jones tersely put it, "protect right against wrong, and "the weak against the strong."

Major Flower dealt with this subject from the point of view of the pollution of rivers. Unlike the Association, he does not propose to create a new public body, but to make use of the existing authorities for ameliorating the present state of the rivers. This is no new idea of his, for as far back as 1876 he suggested, at a conference held at the Society of Arts, that the whole country should be mapped out into districts, each under a competent sanitary officer, whose acts should be legalized by Conservancy Boards to be constituted. He brought forward his idea again at Leeds two years ago; but it was then thought that the establishment of County Councils would meet the case. Major Flower, however, considers that they have enough to do already; and he says the Local Government Board are already too overworked. The question of watershed areas is one on which he can claim to speak with authority; the Conservators of the Lea being the first public body entrusted with the care of an entire area, and he, as their Sanitary Engineer, being the first officer in the kingdom on whom was placed the duty of supervising it. His experience from 1871 as to the value of individual action led him to bring forward his suggestion five years later; and the fact that now, after a lapse of twenty-three years, he has no reason to change his opinion, is strong evidence in favour of the system which he is desirous of seeing generally adopted. His proposal is that Joint Committees should be established to control watershed areas with the object of checking pollution of rivers; and the Council of the Sanitary Institute have been recommended to further this object.

With two such organizations as the Sanitary Institute and the Royal Institute of Public Health in active operation, it cannot be charged against the thoughtful portion of the community of this country that they are neglectful of the people's health, or that they do not interest themselves in subjects which specially concern it. Scarcely had the members of the first-named body dispersed at Southampton, than those connected with the second were in congress at Blackpool, under the presidency of the Marquis of Lorne. His Lordship very wisely did not attempt to deliver a ponderous address. He merely, as he humorously said, "fired a blank cartridge" to clear the course for the artillery practice which would follow in earnest from the lecturers. He, however, dealt in a light and pleasant way with a variety of topics strictly bearing upon public health, including river pollution, water and milk supply, and the smoke nuisance. The sectional work of the congress was interesting, although occasionally, it seemed to us, a little outside the scope of the Institute. The address to the Municipal Section by Mr. T. Loftos, the Town Clerk of Blackpool, on the "Responsibilities of Local Authorities," and the paper by Mr. J. Beckett, of Accrington, on "Local "Indebtedness," which will be found elsewhere, had both been very well prepared. Dr. Graham, in the Chemistry Section, gave some historical particulars on the subject of the smoke nuisance; and, as a step towards its abolition, he advocated the use of gas as fuel, "where it could be "cheapened," on the grounds of economy and cleanliness. He thought provision should be made for the better administration of the Public Health Acts. Next to pure air came pure water—a subject which was dealt with by Dr. J. C. Thresh. He showed that, though much more attention has been given to the protection of river, spring, and well water from pollution than to ensuring the immunity of surface water from contamination, the supply of the latter water has rarely been charged with the spread of typhoid fever; and he assigned as a reason for this fact the storage of the water in large reservoirs, where it is exposed to air and sunlight. Dr. Thresh is of opinion that, supposing a typhoid organism were to get into such a reservoir, it would have but a remote chance of reaching the water-mains in a living condition. This is truly reassuring.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 833.)

THE prolonged tension in regard to South African affairs is having a most disastrous effect on business on the Stock Exchange. In the state of uncertainty in which we are, the maxim of the jobber is, "No business is better than bad business;" and accordingly he prefers not to make a price at all. Things could scarcely be worse if war had actually broken out—indeed, it is likely enough they might be better, for it is preferable to know the worst than to have it constantly hanging overhead. Prices, of course, have gone all to pieces; and the natural drop has been aggravated by forced realizations. The closing price of Consols, be it noted, was 103¾—the lowest price for the last five years, we believe. Money hardened rapidly in the Market; but the small demand in connection with the settlement scarcely had a hand in it, though the close of the quarter was a factor. Discount rates got very stiff; and seeing the run there is on gold, a rise in the Bank rate cannot be far off. In the Gas Market, though less likely to be agitated by wars and rumours of wars, business was almost as quiet as in any other department. Despite the universal drop in values, prices of Gas securities kept up wonderfully well until towards the close, when the pinch for money was becoming more acute, and a rather more pronounced tendency to ease was apparent. In Gaslight issues, the ordinary was quickly put down half a point on Monday. The actual prices realized were, however, no worse, but rather better; and on Wednesday 105 was marked. On Friday, when things generally were queer, 104 was the mark; and the preference also had to go down a point. South Metropolitan was done at top price on Tuesday; but this high level could not quite be maintained. Hardly anything was done in Commercials. The issue of their accounts (which completed the gas record for the first half of 1899) shows them in the satisfactory position of being able to keep up the rate of dividend with only a slight reduction of the balance carried forward. If the shareholders will but recognize the policy of raising future capital on the cheapest possible terms, as all their friendly rivals do, their position will be materially strengthened for many years to come. Very little was done in the Suburban and Provincial group, except British, which was at one time only 44½ *cum div.*, but subsequently marked 44¼ *ex div.* The Continental Companies were very quiet, and devoid of feature. Among the rest, the only one noticeable was Cape Town, which advanced on an interim dividend of 8 per cent. The Water Companies were as quiet as ever, and no changes in value took place.

The daily operations may be briefly summed up: A fall of ¼ in Gaslight ordinary on Monday. A rise of ½ in Cape Town on Wednesday, and a similar rise on Friday. On Friday also Gaslight preference receded 1.

ELECTRIC LIGHTING MEMORANDA.

The Alliance between Newspapers and Electricians—The Dearness of Electric Lighting—Strand Lighting to be Improved (?)—An Electric Lighting Scheme for Ramsgate.

AT this season of the year, when the fancy of the young electrician and engineer with a position still to make lightly turns to thoughts of parliamentary engagements for next session, the alliance between the newspaper Press and the electric lighting interest becomes manifest. The best London and Provincial newspapers put forth a crop of intelligence relating to the alleged successful and profitable working of electric lighting schemes in all parts of the country, which is well calculated to prime ratepayers to entertain favourably schemes of the kind for localities still unblessed with such municipal enterprises. It is desirable, therefore, that those who are able to see a little farther into the mystery of municipal profit-making than the average newspaper reporter, should bestir themselves in order to prevent these sanguine representations from being generally accepted as giving the whole truth of the matter. Take, for example, a recent statement appearing in the "Pall Mall Gazette," that "the profits on the St. Pancras municipal electric lighting scheme (the parish where it was first introduced in London) last year amounted to £4175; the charge to consumers being 4·64d. per unit. The Hampstead profits were £8340, and the price 5·10d. per unit; Islington, £2206, price 5·79d.; and Shoreditch, £4175, price 4·64d.; Hammersmith, profit this year £720." This looks very attractive; but is it true? As a matter of fact, the statement is illusory throughout, although the figures may be, and doubtless are, drawn from official returns. The prudent man of business knows very well that nothing is more deceiving than the term "profit," when used with a particular intention. We are not going into the accounts of all these London Vestry electric lighting concerns, but will remark, in passing, that it is easy enough for a local authority to show a profit on this business when (*a*) nothing, or not nearly sufficient, is allowed for depreciation; (*b*) nothing is said about the amount of lighting forced upon the rates for the streets, public buildings, reading rooms,

and even workhouses, and (*c*) nothing is charged for management, and very little for any branch of expenditure that can be charged to another account.

There is Shoreditch, where, as reported in the "Daily Chronicle," the Vestry Clerk boasts that gas "will be banished" within five years. What with the "utilization" of the surplus heat of dust destructors burning 23,000 tons of refuse, and of the "waste steam from the engines for heating the public baths," the electricity supply accounts are stated to show an "available surplus" of £6463. It is doubtless wanted, to pay for the capital represented by all this combination; and when the conclusion is drawn that "were the undertaking in the hands of a private company these figures mean that there is a sufficient balance to pay a dividend of no less than 8¼ per cent.," we can only say we should like to have the word of an independent, responsible professional auditor for it. It is hard to find the pea under so many thimbles. The manner in which electric lighting is being pushed in Shoreditch is disclosed by the remark that "the tenants of the Vestry's new dwellings in Moira place will be able to take advantage of the new illuminant." Exactly; and the Vestry will also be careful to take advantage of every opening they can lay hold of for forcing custom for this business of theirs. Gas engineers do not mind. The electricians cannot get over the fact that their light is far and away dearer than gas; so that wherever it goes, if the public will not pay for it directly, they must do so indirectly through the rates. This fundamental truth of the situation comes out clearly enough in the report of the Surveyor to the Vestry of St. Martin's-in-the-Fields on the proposed extension of electric lighting in the streets of this West-Central region. The parish, for several reasons, cannot do its own electric lighting; but it has the advantage of being served by the lowest-priced Company in London—the Charing Cross and Strand Electricity Supply Corporation, who have just gained admission to the City on this same account. Mr. Green, the Surveyor, has mapped out the principal thoroughfares in the neighbourhood of Charing Cross for 92 arc lamps of 500 watts, modestly rated at 1000-candle power each. "The extra cost of lighting the parish by electricity will be £1362 per annum for the first seven years, and afterwards £561 per annum more than the present cost of gas lighting; but the lighting power of the district will be increased by 79,000 candles, and the ease with which the streets could be lighted in times of fog or sudden darkness would be much facilitated." The lamps will be placed 60 yards apart, and, as far as possible, in the centre of the carriage-ways. The contract for this lighting has been made, and the job is actually in hand.

We venture to characterize this latest Metropolitan street lighting "improvement" as a piece of senseless and injurious extravagance. It is the old story of making a glaring show in the great thoroughfares, while the back streets—the lighting (?) of which in this shady part of London is a disgrace to the authorities—have to relinquish all hope of improvement. In this case, the lamps are to be put in the worst of all possible positions for the foot and vehicular traffic. The example of the adjoining Waterloo Place is to be perpetuated—that is, the footways are to be in semi-obscurity, to the joy of undesirable characters; while nobody will be able to see the destination of a passing omnibus, or to get in or out of a cab on the light side. In order to cross the road, one must run against a dazzling light on one side, and turn one's back to the light on the other. This is "improved" street lighting, as understood in London! The same objection to the disposition of the lights would hold good, whatever the system; but that electricity can only make this exhibition of itself at a heavy additional cost to the ratepayers over that of gas, is adding injury (of the pocket) to insult (of the intelligence).

An interesting report on the proposed supply of electricity within the borough by the Corporation of Ramsgate, has been prepared by Mr. W. A. Valon. The whole tenour of the report should go to disprove the idle charge that corporation gas departments and their advisers are adverse to electric lighting. Mr. Valon positively recommends his Corporation to undertake the supply themselves; and, having taken counsel with Mr. Alfred Colson, of Leicester, he prepared a scheme which the Corporation have decided to carry out. He admits that the undertaking will probably show a loss on the working for the first few years, but thinks it will pay for itself eventually. The undertaking will not enjoy the doubtful advantage of being pampered at the expense of the ratepayers for the street lighting and so forth, because this has been already taken care of by the Gas Committee. The business to be done will therefore be almost wholly confined to private lighting, and such municipal lighting as the Corporation can legitimately find for it. The district is a very compact one; and Ramsgate doubtless has a reasonable claim to the luxury of electric lighting.

Cranes and Lifting Machinery.—The Technical Publishing Company, Limited, have brought out a new and enlarged edition of Mr. E. C. R. Marks's "Notes on the Construction of Cranes and Lifting Machinery." In addition to the whole of the matter which appeared in the original issue, there are chapters dealing with electric elevators and cranes and special machines for facilitating the loading and unloading of ships. The text is very fully illustrated—153 diagrams to 183 pages of matter.

LESSONS FROM GERMANY AND DENMARK.

After such a pilgrimage as that of members of the Institution of Gas Engineers to Berlin, Copenhagen, and Hamburg, it is natural that the pilgrims should ask themselves, and be asked by their home-staying colleagues, what they have learnt from the things they saw and heard relating to technical matters. There was very much to see, and but a brief time in which to see it; so that although those who showed the things were most anxious to display and explain everything, it is small wonder that the sights of the tour course like a phantasmagoria through the brains of those who conscientiously strive to recall their impressions, after a few days occupied in picking up the dropped threads of the every-day professional routine at home. Many points of technic, salient enough at the moment, will have dropped out of remembrance; and not a few carefully-made memoranda will be decipherable with difficulty even by this time. In a few weeks, or months, most of the swiftly-imprinted travellers' thoughts will have faded utterly; leaving as permanent memories only a few observations of very various importance. Before this natural and inevitable process has had time to proceed very far, it is our desire to place on record a few observations suggested by the technical "exhibits" of the trip. We do not propose to attempt to record in detail, or with great precision, matters of measurement, names of designers or makers of plant, costs and prices, or concrete "facts." We want, in brief, to see the wood and not the trees. Every necessary piece or particle of exact detailed information exists elsewhere. With regard to the modern practice of gas-works construction and equipment in Germany, reference is due to the noble generosity of the German Association of Gas and Water Engineers, in having a presentation volume of plans and descriptions of eleven of the newer German gas-works specially prepared and dedicated to the English visitors, who received their copies *en route*. It was a graceful attention, and a valuable gift. Although in the German language—and, of course, with all measurements and quantities in the metric system—the technical matter in this book is easy of comprehension; and the drawings speak all tongues. All the particulars of the works in Denmark with which the name of the President of the Institution (Mr. F. D. Marshall) is identified, have already been reported to the Institution.

Free, therefore, from the obligation to saddle every observation on works and plant with a statement of dimensions, what are the characteristic features of German and Danish gas making? It should be premised that the visitors were not, in any instance, shown results. Consequently, they could only form their judgments on plans, designs, and works executed and in operation. They had no means of ascertaining whether the gas making they saw worked out after all better or worse than any example with which they might have been fully conversant at home; but this lack of a commercial datum was unavoidable, and proceeded from the nature of things. Technic is not business—or, rather, it is only the groundwork of the gas business, the commercial and even industrial bearings of which rest upon widely different bases in different countries. It would not have taught the strangers anything to have had the run of the account-books of the foreign undertakings, while they could learn much from the appearance of the works, and the manner in which the manufacturing operations appealed to their expert perception.

In the laying-out of modern German and Continental gas-works generally, spaciousness and elegance are very apparent. The buildings belong to the monumental type, for solidity and ample proportions; but it is not the borrowed type of some of the last generation of English gas-works builders who shall be nameless, whose tastes ran to "ornament," while they seemed to wish to make their works look anything rather than what they actually were. Schmargendorf and Charlottenburg are examples of the lavish spending of capital in the embodiment of ideas. There is a reason for everything, which the scientific mind can readily appreciate; but whether the science is in all respects sound business, is another question. The impression given by such works as these is that the cutting down of the price of gas to the lowest possible figure, or the wringing of the last penny of profit out of the business, is not the only care of the designer of the works and the owners of the property. Regard is had to what may be styled the amenities of gas making, and its reduction to a rule of exactitude and reliability. All the processes of treating the gas while on the works are carried on under comfortable cover; and everything is put as far as possible under control. Thus—to pass on for a moment beyond the carbonization—condensing is everywhere effected indoors by a combination of air and water cooling which can be regulated to deliver the gas at the outlet of the apparatus, in all weathers, at about the same temperature. The condenser-house always contains also a tar-extractor, on the impact principle usually associated with the names of Pelouze and Audouin. The apparatus is modified (as by Drory) in various ways; but its intention is always the same—to free the gas from tar as thoroughly as possible in that particular place. This apparatus is placed after the exhauster. For success, it must be worked at a fairly constant temperature. At Schmargendorf, the exhausting was done by an interesting survival of the reciprocating plan; but this did not present any recognizable advantages. A useful kind of exhaust bye-pass regulator, by Oechelhaeuser, was found in very

general favour. In some works, mechanical separation of the water from the tar has been rendered necessary by the requirements of the tar distillers. It is done by a centrifugal machine. Washing and scrubbing is much the same at home and abroad; some apparatus of the kind bearing familiar English names. The Continental manufacturers, however, are very keen in this line of business, and claim to have improved upon the English models by attending to economy of weight.

Where lime is never seen, the purification of gas is a comparatively simple and cleanly process. A good deal of intelligent effort is being directed to save hand labour in the manipulation of the oxide. Finality in this regard seems yet far off. It is a cheap kind of criticism of mechanical arrangements designed to save labour, that suggests itself readily enough when men are seen supplementing or regulating the operation of elevators, or shakers, or other devices meant to be self-acting. There is a pedantry of labour-saving machinery, as there is of most human studies, which is occasionally carried to ludicrous excess; but, on the other hand, it should not be forgotten that very few machines can be trusted to run alone at first.

In the German gas-works, the general completeness of the housing of the apparatus, and the scrupulous cleanliness of every part of the works, tend to minimize the impression created in these regards by the station-meter house—which in some English gas-works is a sort of "holy of holies." There is no such exaggeration of respect for the meter in German practice, which is well. Then, as to that absolute stranger to modern English gas engineering practice—the gasholder house—it is expedient to exercise some reserve of judgment. The Germans like it—which is no hindrance to their tolerating on occasion the very opposite principle in gas-holder construction, the Intze system, in which both tank and holder are quite exposed above ground. The first example of a housed gasholder seen at close quarters during the trip was the truly magnificent structure at Schmargendorf. This is a new three-lift holder of 2,750,000 cubic feet capacity, and cost (it was stated) about £40,000 all told—under £15 per 1000 cubic feet of storeage. This structure, it must be confessed, does not strike one as dear at the price. Housed gasholders, it must be remembered, were the original fashion in English gas-works. Their advantages are many and great. The gas in them is neither roasted nor frozen. In severe winters, the difference between the working of a housed and an exposed telescopic gasholder is past expression. When the temperature of the air is at zero or thereabouts for weeks together, steam thawing of the seals becomes a mockery. With icicles measurable in feet either way, hanging from the upper cups, the working of a naked holder at such times becomes a ticklish business. Even in England some of the divisions of a multiple-lift holder have been obliterated during hard seasons, so that the two upper lifts have been worked as one, not a hundred miles from Charing Cross! It would be altogether out of keeping with the careful German gas management to store gas with full exposure to climatic vicissitudes after it had been so assiduously watched over throughout its earlier stages. There is usually not such a multiplicity of gasholders of all ages and sizes in a German gas-works as may often be witnessed cumbering the ground of an English station. With a good big holder for winter use safe and sure in a house, and a small Intze holder for summer use—speaking, of course, very generally—the German gas manager is very comfortable. One cannot wholly repel the suspicion that he knows what he is about. He seems to be possessed with the idea that the maintenance of a fairly equable temperature is for his gas the chief thing desirable, with a view to the saving of possible trouble.

We had intended to say something about carbonization in this notice; but so important a topic deserves an article to itself, and we will conclude this one with a few observations on minor subjects. The service of the governor-house on the Continent is always well arranged and looked after; but nowhere is it carried to a higher point of efficiency than at the new Frederiksberg works of the Danish Gas Company, where the district governor is self-acting, on the Ledig system. There is here a check or sentinel governor, from the holder to the main governor, which keeps the latter under a constant initial pressure. Then, as the consumption varies, a syphon arrangement is made to put on and take off weight on the district governor-bell. It was generally thought that this device is only applicable in cases where the distributing system is everywhere adequate to the calls upon it—a very natural, but unfortunately not always a realized, requirement. Almost without exception, the exhauster-engines at the different works were fitted with a very excellent positive lubricating device—system Hahn—which seemed to answer admirably. All the machinery used in the direct and auxiliary work of gas making was of the very first order of excellence in strength and finish, without an atom of frippery. Lastly, stress must again be laid upon the admirable order and cleanliness preserved in all the yards and in every machine and plant house. The pipe connections were never exposed, but always accessible. The valves were as spick and span in the condenser-houses as in the engine-room. The lighting of the yards and gangways was done by means of good, handsome fittings. Everything about the works' equipment was such as both masters and men could take a pride in. It was all "ship-shape," neat, and appropriate to its purpose. There must be, one supposes, old gas-works in Germany which have had to be extended and patched out of all resemblance to anything but themselves; but on the recent trip they were not shown.

Germany is "booming" just now; and the gas industry is being borne along on the crest of the wave. The municipal gas-works appear to enjoy the command of limitless capital, which is being spent right royally on bricks and mortar, land and machinery, steel and cement. It is whispered that the socialistic element, which pervades German municipal governments from top to bottom, is anything but averse to the expenditure of money in this way. Thus the national products are kept in demand, and employment abounds. There may be a day of reckoning for all this; and we have a shrewd suspicion that the long-headed chiefs of the Imperial Continental Gas Association, the German Continental Gas Company, and the Danish Gas Company, are not disposed to commit themselves to the "flowing tide" quite so freely as the municipal gas suppliers beside whom they live. The necessity for being so far as possible independent of hand labour, has come upon the Danish Gas Company sooner than on the German industry. Hence Mr. Marshall's devotion to automatic coal and coke handling and gas making in all its branches. But the others will have to follow suit. This thought, however, opens up a vista that cannot be entered upon now.

GAS ACTS FOR 1899.

(*Continued from p.* 753.)

The Cambridge University and Town Gas Act extends the Company's limits of supply to include the whole of several suburban parishes now partly supplied. Additional capital to the amount of £60,000 is authorized, to bear a 5 per cent. dividend, with one-fourth the amount of loan capital bearing not more than 4 per cent. interest. Sanction is given for the laying of an oil pipe-line from the railway sidings of the Company to the gas-works. For the protection of the Corporation of Cambridge, it is enacted that where the Company break up any public road repairable by the inhabitants at large, they are not to be entitled to reinstate the roadway themselves; but this is to be done, on receipt of notice, by the Corporation at the Company's expense. Certain lands may be sold; the provisions of the Lands Clauses Act and the Gas-Works Clauses Act of 1871 being abrogated. The Companies Clauses Act, 1845, is amended to permit of the election of a paid auditor. Sanction is given for dealing in gas-stoves, &c., and for the laying of pipes in undedicated roads. The Company have the right to inspect new gas-fittings, with appeal to the Mayor of the borough as assessor. Sixteen-candle gas is to be supplied, tested at the Guildhall. A sulphur limit of 20 grains is imposed.

The Hastings and St. Leonards Gas Act extends the limits of supply to include many parishes named in a schedule. Additional land, to the extent of nine acres, is to be acquired; and "the Company may also for the purposes of their undertaking lay down in, on, or under lands of the Company, in, on, or under any street or place dedicated to the public use, and maintain and renew mains, pipes, tubes, wires, and other apparatus for the purpose of carrying or conveying oil, tar, pitch, asphaltum, sulphate of ammonia, ammoniacal liquor, and all other products or residuum of any materials employed in, or resulting from, the manufacture of gas, and for effecting telegraphic or telephonic communication between to or from the Company's works and offices." Provided that the consent of the Corporation must be obtained for any oil pipe-lines exceeding 300 yards in length. The old gas-works in the town is to be discontinued within 10 years. A part of the Act relates to a stock conversion scheme, by which the original 10 per cent. and the 7 per cent. capital are made into 5 per cent. and 3½ per cent. stock respectively. Additional capital is authorized to the amount of £250,000, in the form of new 5 per cent. stock, with power to borrow one-third. The standard price of 4s. per 1000 cubic feet enacted for the borough in 1883 is confirmed and extended to the existing borough; but is to be reduced to 3s. 10½d. immediately on the expiration of a period of 10 years from the passing of the Act, or at such earlier period as the greater portion of the coal used by the Company in the manufacture of gas shall be carbonized at the new works at Glyne Gap. The aggregate amount of the undivided profits of the Company, including insurance fund, reserve fund, and balance carried forward, is limited to £55,000 at any one time. The Company may deal in, but must not manufacture, "articles and fittings." The rate of interest payable on consumers' deposits is reduced to 4 per cent. The use of anti-fluctuators may be required for gas-engine services. The prescribed testing-place for gas is to be at the Hastings Town Hall, "or at such other convenient place provided by the Corporation as may be agreed upon between the Company and the Corporation where gas can be obtained from a trunk main in constant use." The testing apparatus is to be provided by the Company to the approval of the Corporation; and both parties are to have free access to the testing-place at all reasonable times. No prosecution for penalty shall follow any test unless the Corporation shall have given the Company at least two hours' notice of their intention to make the test, so as to allow of the Company being represented at such test. The 10-candle pentane lamp, and the method of testing described in the Notification of the Metropolitan Gas Referees in September, 1898, are to be adopted. The penalty for the first half of a

candle of defective illuminating power is 40s. The same penalty attaches to an excess of ammonia beyond 4 grains in 100 cubic feet of gas. The Company may apply for electric lighting powers; but not for the borough. Railway sidings may be constructed for the new works.

The Lea Bridge District Gas Act enables the Company to acquire 10 acres of additional land. All the shares in the old capital of the Company are to be consolidated and converted into £130,242 consolidated ordinary stock, bearing a standard 5 per cent. dividend. The amount which the Company may carry to their insurance fund in respect of their paid-up capital represented by the shares so consolidated and converted is not to be affected by the operation. Additional capital to the amount of £150,000 is sanctioned, with power to borrow one-fourth. The standard price of gas enacted in 1878 is altered to 4s. 6d. per 1000 cubic feet. The night pressure at the top of any public lamp service is to be 1 inch. The illuminating power of the gas is 15½ candles, tested at the Town Hall, Walthamstow. The sulphur clauses are imposed. The amount of surplus profits carried forward in any year, after paying into the insurance fund, is not to exceed £6000. Mains may be laid for ancillary purposes.

The Shotley Bridge and Consett District Gas Act extends the limits of supply by the Company to include the township of Healeyfield, in the parish of Lanchester. The old capital of the Company is to be consolidated and converted into a uniform 5 per cent. stock. The reserve fund is not to be increased by reason of the consolidation. Additional capital to the amount of £36,000 is authorized, with one-third loan. The proportion of borrowed money to the original consolidated capital is limited to £10,000, which is one-third of the amount at which the stock stood before conversion. The Directors may declare interim dividends. The night pressure of gas is to be 8·10ths at the main as near as may be to the junction therewith of the service-pipe. Fifteen-candle gas is to be supplied, tested at the works.

The St. Albans Gas Act extends the limits of supply by the Company to include the whole of certain suburban parishes already partially supplied. All the shares in the old capital of the Company are to be consolidated into a 5 per cent. stock, with the addition of £40,000, and power to borrow one-fourth of this amount. The sliding-scale is enacted, the initial prices of gas being 3s. 4d. per 1000 cubic feet within one mile radius from the Town Hall, and 3s. 10d. elsewhere within the limits of supply, for 15-candle gas. The Company are empowered to accept a transfer of the Electric Lighting Order appertaining to the Corporation, and to work the same, raising a separate capital of £40,000 for the purpose, with one-fourth loan. There is a provision for the re-transfer of the electric lighting undertaking to the Corporation.

The Stretford Gas Act empowers the Company to acquire additional gas lands compulsorily. Additional capital to the amount of £160,000 may be raised at 5 per cent., with one-fourth loan. An insurance fund of 1 per cent. on the paid-up capital may be formed, with explicit reference to compensation for accidents to employees. Prepayment for gas may be required at the discretion of the Company. The right of inspection of new consumers' fittings is granted, with appeal to a Court of Summary Jurisdiction. Notice of appeal, "and of the grounds thereof," is to be given to the Company's manager. Interest on consumers' deposits is reduced to 4 per cent. Sixteen-candle gas is to be supplied. The Company are forbidden to make use of a certain street in the urban district of Stretford for the carriage of tar or of ammoniacal liquor, under a penalty of 40s., recoverable summarily upon the complaint of the Council.

The Walker and Wallsend Union Gas Company's (Electric Lighting) Act, as the title implies, enables the Company to supply electricity within certain parts of their district. It is practically an Electric Lighting Order, erected into a Special Act. The electric lighting capital is £100,000, with power to borrow one-fourth; and the undertakings of gas and electricity supply are to be kept separate and distinct. The District Councils of Wallsend and Willington Quay may at any time apply unopposed for electric lighting powers in their respective areas.

The Walton-on-Thames and Weybridge Gas Company's Act authorizes the Company to raise additional 7 per cent. capital to the amount of £35,000, with one-fourth borrowing powers. Fittings on hire are made exempt from distress.

The Yeadon and Guiseley Gas Act provides that the sliding-scale shall as from the commencement of the Act apply to the Company, with 3s. per 1000 cubic feet as the initial price. Special provision is made for the supply of gas to the Menstone Asylum as a "public purpose" within the meaning of the Act of 1868. Fifteen-candle gas is to be supplied. The Company may apply for an Electric Lighting Order.

Coke for Locomotive Firing.—It was recently mentioned in the "Engineer" that coke was being successfully used on the Boston and Maine Railroad in the United States. It appears from later information which has reached our contemporary that there are 100 engines being worked by this fuel. On the long-distance passenger trains, the practice is to fill the fire-box up to the door, and not fire again till steam is shut off. By so doing they are able to run from 10 to 15 miles without touching the fire. But on trains making frequent stoppages, firing is done at shorter intervals.

WAGES AND HOURS OF LABOUR.

THE following is a summary of the principal features of the recently published report of the Labour Department on the Changes in Rates of Wages and Hours of Labour in the United Kingdom which took place in 1898. The year was one of active employment; the proportion of unemployed workpeople being lower than has been the case for several years. It was, therefore, to be expected that it would be a year of rising wages; and the statistics given in the present report show that, both as regards extent and magnitude, the upward changes recorded far surpassed those returned for any of the previous five years for which particulars have been collected.

No fewer than 1,015,169 workpeople were reported as affected by changes of wages in 1898. Of this number 1,003,290 received increases, equal, on an average, to 1s. 7d. per head weekly. Even this large total is exclusive of agricultural labourers, seamen, and railway servants, with regard to whom—for reasons given in the report—the numbers affected cannot be exactly stated, though the statistics obtained show that wages in these employments shared in the general advance. The net result of all changes was an aggregate rise of £95,000 per week. From the preliminary figures given for the first half of the current year, it is evident that the upward tendency of wages is being sustained. Nearly a million persons have already received, in 1899, a net weekly increase amounting to £50,000. The bulk of the increase recorded, both this year and last, is accounted for by the general upward movement of coalminers' wages (especially in Scotland), though there has also been a marked advance in the metal, engineering, shipbuilding, and general building trades. In the gas industry, 7489 workers—chiefly stokers—were reported as receiving increases in wages, 6624 of whom were employed in the Metropolis. No reductions in the wages of gas-workers were recorded.

While the year 1898 witnessed so great an increase in wages, changes in hours of labour were comparatively insignificant. Less than 40,000 persons are reported as having had their hours altered; the aggregate reduction being computed at about 82,000 hours per week, compared with upwards of 285,000 in the previous year. There was no general movement for the eight-hours day in any trade during the year; but two large firms, employing altogether 1857 workpeople, voluntarily conceded the 48-hours week. The reversions from the eight-hours day to longer hours of labour reported were insignificant.

In the vast majority of cases, the readjustment of wages took place without any stoppage of work; 95 per cent. of the persons affected in 1898 having had their wages changed without a strike. The proportion would be somewhat lowered if the rise in wages received by the South Wales coalminers on resuming work after the prolonged strike (as to the re-establishment of the sliding-scale) were ascribed to that dispute; but, in any case, the changes of wages following trade disputes formed but a small fraction of the whole. In the great majority of cases, the changes were amicably arranged directly between the parties.

The general state of employment and trade, compared with former years, may be gathered from the following table :—

Year.	Unemployed Members of Certain Trade Unions.	Average Number of Days per Week worked by Collieries.	Value of Imports and Exports (exclusive of Re-Exports).
	Per Cent.	Days.	
1894	6·9	4·8	£624,000,000
1895	5 8	4·7	643,000,000
1896	3·4	4·9	682,000,000
1897	3·5	5·1	685,000,000
1898	3 0	5·2	704,000,000

RECENT PUBLICATIONS.

Our Treatment of the Poor. By W. Chance, M.A. (P. S. King and Son.)

In commenting upon the report of Mr. Chaplin's Committee on Aged Deserving Poor, we remarked that it behoved us to keep the sentimental aspect of the question in its proper place; and Mr. Chance's book is eminently calculated to assist in so doing. Writing with the knowledge and experience of a Guardian of the Poor and a Charity Organizer of some standing, Mr. Chance has set himself to prove that no State-aided old-age pension scheme can be produced that will not, by weakening the moral backbone of the working classes, do infinitely more harm than good; and he opens his preface with an out-and-out declaration against the sentimentalists :—

> The close of the present century is being marked by an outbreak of sentimentality on matters connected with the relief of the poor which threatens to get the upper hand of sense. A similar outbreak occurred at the end of the last century; and its evil results are well known to all students of Poor Law history. These results, however, seem to be generally forgotten now, or, if they are remembered, it is argued that circumstances have entirely altered, and that, while the interference of the State to do more than merely relieve *destitution* was undoubtedly wrong in the then state of society, it cannot have the same evil effects now that such an improvement in the condition of the working classes has taken place. On the other hand, those who, like myself, believe that human nature has not altered fundamentally in the slightest degree during the last hundred years, and

that if the State undertakes to do more in the way of charity than merely relieve *destitution* the present progress which the working classes have made towards independence must be at least checked, even if there be no actual retrogression, should exert every effort to limit the action of the State in this matter as far as possible to its proper function—viz., the relief of *destitution* only.

The book might, in fact, but for the last chapter, have almost been given the title of "The Case against Old-Age Pensions;" for, in addition to the fifty pages specifically devoted to that subject, all the articles except that upon Poor Law Schools (which does not form an essential part of the work) have a direct bearing on, and support, the author's position in regard to provision for the poor in old age.

Mr. Chance—like the writer in "The Times" whose article on the Poor Law we recently noticed—looks upon a State (or rate) provided pension—for others than the actual servants of the State or of Local Authorities—as only another form of outdoor relief; and for the granting of outdoor relief as a rule, and not as an exception, he has nothing but condemnation. His first chapter—or rather article, for, although we are not told, we gather that the book is a collection of articles each written *ad hoc*—is entitled "A Model Union and its Lessons," and is designed to show, by means of concrete examples, the evil effects on all sections of the community of a policy of outdoor relief, in contrast with the healthy effect upon the poorer classes of a strict, intelligent, and humane administration of the Poor Law.

The model Union instanced is that of Atcham, in Shropshire; and some remarkable statistics are given of the reduction in pauperism effected therein between the formation of the Union in 1836—that is to say, upon the coming into effect of the reformed Poor Law—and the present day. In November, 1836, there were, in a population of about 18,000, as many as 1395 paupers (other than lunatics and vagrants), including 271 bastards—a pauper rate of about 8 per cent. of the population. In March, 1898, there were only 465 paupers, including 16 illegitimates, in a population of nearly 50,000—a pauper rate of less than 1 per cent. The poor-rate in the three years 1833-5 averaged 1s. 4'4d. in the pound; while for the year ending Lady-day, 1898, it was 4'1d. in the pound. "These wonderful results," says Mr. Chance, "have been achieved solely by the carrying out of a consistent policy of restricted outdoor relief over a period of about sixty years, while keeping the establishments for the relief of the indoor poor up to a high standard of efficiency."

The rules adopted by the Atcham Board of Guardians—of which Sir Baldwin Leighton was Chairman from 1836 to 1871—are given in detail, and the various reasons leading to their adoption fully explained; while many valuable hints are thrown out for the guidance of those responsible for the administration of the law. To these, as being for the special consideration of those administrators, and to the author's interesting discussions of the relations between public and private charity, we can only call attention, and pass on to consider—what is of much more general interest at the present time—Mr. Chance's attitude towards the charge frequently brought against the present system of relief, that the method of its administration is in many cases cruel to the poor; and, further, his arguments against the suggestion that the State should make some provision for the aged destitute, or partially destitute, less repugnant than the workhouse. We cannot, in the space at our disposal, discuss these arguments, at any rate in any adequate manner. The subject is much too large and many-sided. We can only indicate the line taken, and leave our readers to study the arguments in detail at first hand.

First, as to the harshness of the Poor Law. Mr. Chance's position may, we think, be summarized somewhat as follows: The Poor Law is only intended to relieve destitution. The duty of its administrators is to discourage improvidence and thrift lessness, and the idea that a man need not provide against sickness or old age because there is always poor relief to be had. It should be the last, not the first, resource to which the poor should turn in case of need. Practically all labourers can, if they choose, provide against sickness and old age through Friendly Societies, but will not in many cases do so if pauperism be rendered attractive; whilst the cases of genuine, undeserved and honourable destitution in old age could always be rescued from the degradation of pauperism if those responsible for the distribution of charitable relief could be brought to act in a reasonable and concerted manner. Such cases are fewer than the sentimentalists would have us believe; and, owing to better education and the growth of the Friendly Society movement, are steadily becoming fewer still. In short, to remove from the minds of the poor their aversion to "the house" is to remove one of their greatest incentives to thrift and independence.

Further, Mr. Chance holds that, for similar reasons, outdoor relief, being less repugnant to the poor, should be, as far as possible, extinguished in favour of indoor relief. This, he says, would have the effect, not of driving the poor to the workhouse, but to independence. He also expresses his belief that the outdoor form of relief is the really cruel policy, for the following reasons: It can never, because of the necessity of guarding against fraud and deception, be really adequate, if adopted as a general policy of relief. "Imagine 2s. 6d. a week to an old man or woman who is destitute! . . . I venture to say that more persons have died of starvation from the receipt of inadequate outdoor relief, than have died from the refusal to enter the house." If it were only granted in special cases, it could be made adequate. It tends to keep up dwellings unfit for habitation. "Outdoor relief but helps to crystallize this combination of poverty and wretchedness, and, by paying the rent, allows it to exist."

Again, by its expensiveness, outdoor relief often prevents Guardians from bringing their institutions up to the proper standard of comfort for those who are really compelled to have recourse to them: "The worst workhouses, with the most inefficient officers, will be found in Unions where outdoor relief is most freely given."

This brief mention of some of the many arguments adduced by the author against the systematic granting of outside allowances serves also to indicate the line taken by him in regard to the various schemes for State-provided pensions. Against the many schemes for State-aided pensions—that is, schemes requiring evidence of thrift from the applicant—Mr. Chance urges difficulties of practical working, and the fact that they would not touch the really hard cases. Whether, however, one agrees or disagrees with his conclusions, his chapter on "Old-Age Pensions" (including the appendices thereto) will be found most valuable by everyone who takes an interest in the history and discussion of the subject. The agitation in favour of a national scheme is traced from the time when Canon Blackley published, in 1878, his scheme for compulsory old-age insurance, down to the appointment of Mr. Chaplin's Committee—a step which the author hoped was intended to give a decent burial to the various schemes killed by Lord Rothschild's report. Having outlined, analyzed, discussed the arguments for and against, and condemned every scheme of note yet brought before the public—details of which are given, together with the constitution and findings of the various Commissions and Committees appointed to consider the subject—Mr. Chance declares that, in his belief, the Friendly Societies can and will undertake the duty when the agitation for State aid has subsided; and he endorses the hope expressed in the report of the 1896 Committee:—

> Before closing our report, we desire to refer to one consideration which the course of our inquiry has strongly impressed upon us. It is that a large and constantly increasing number of the industrial population of this country do already, by prudence, self-reliance, and self-denial, make their old age independent and respected. We entertain a strong hope that the improvement which is constantly taking place in the financial and moral condition of labour will do much to deprive the problem we have had to consider of the importance now attaching to it.

Why, therefore, says Mr. Chance, should you, by adopting a scheme which would tend to lower wages, tax the thrifty labourer for the benefit of the unthrifty? Finally, he concludes:—

> What we have to see to is that the Poor Law is wisely and justly administered, and that those old people who have to resort to its help as their last resource are kindly and considerately treated, and that, if ill, they are properly nursed and cared for. If the Poor Law wants reforming, by all means let it be reformed; but by making any separate provision for the relief of the aged poor by the State, we shall be merely setting up a new Poor Law, and establishing a privileged class of paupers, among whom will be found many who are now entirely independent of State aid, while we shall not be relieving to any appreciable extent the existing Poor Law of the burden which it now has to bear.

We must close this somewhat lengthy notice by saying that we have found Mr. Chance's work very interesting, though somewhat disjointed. It would be greatly improved by being re-written and welded into a book. It is now only a series of essays, bound, but not connected, together; and, from their having been, as we have said, written independently of one another, they contain needless repetitions, whilst, on the other hand, arguments all bearing upon the same question are found scattered over the several articles. Should the author undertake such a revised edition, might we suggest that he should make up his mind which is the correct preposition to follow the word "different"? He sometimes uses "from," but appears to prefer the incorrect—but only too commonly used—"to." On pp. 124 and 125, they appear opposite one another. There are also one or two printers' errors.

The London Manual, 1899-1900. Edited by Robert Donald (Edward Lloyd, Limited.)

"With every new issue the 'London Manual' has increased in popularity and usefulness. The book has now established itself as an indispensable work of reference to everyone connected with, or interested in, the numerous public bodies which govern the Metropolis." We do not know if this publication has ever before received due notice in the Press. Probably scores of notices, worded similarly to the above quotation from the Editor's self-satisfied introduction, have been written by book-weary reviewers who have read the title and scanned the preface. Such notices are worse than useless; they are not fair either to the public or to the publisher. We propose not to accept, but to examine, this claim to the description of useful and indispensable.

We naturally turn, in the index, to "Gas Companies," and are referred to p. 210, only to find there the heading "London's Water Supply." Glancing through the pages devoted to this subject, we come upon three of the most useless and mis-begotten maps we have ever set eyes upon. That of "The Area of the Water Companies" is particularly execrable. Under the heading "Water Companies' Law," we find the following interesting statements: "A company is not bound to tell you the amount due, or (*sic*) to give notice that it is *not* due. . . This is the law; and it is well to know it." Does the writer imagine that

any person who had not the advantage of access to the "London Manual" would expect to be constantly reminded by the Water Company that he did not owe them any money? or what does he mean? "No Company wishes to cut off, as it excites public feeling!" Any comment of ours would, we feel, only spoil this delightful piece of humour.

We eventually find "Gas Companies" on p. 221. Rather less than two pages are devoted to information under this head; and of the "usefulness" of the information we will give some few examples. "Gas in London is supplied mainly by three Companies—the Gaslight and Coke Company, the South Metropolitan Company, and the Commercial Company. Other Companies, whose main districts are in the suburbs, supply certain areas in Hammersmith, Wandsworth, and Camberwell." Since when, may we ask, have the South Metropolitan Company ceased to supply Camberwell? "Gas. . . is officially tested by the Chemists' Department of the County Council." No mention, we observe, of the City of London's share of the duty. So much for the first paragraph. Proceeding, we find the name of the Hon. Henry Noel among the Directors of the Gaslight and Coke Company. Mr. Noel died in June, 1898; and the name of Mr. John Miles, who succeeded him, has appeared upon the last three balance-sheets of the Company. So far the first page, which is headed "Charges, Profits, and Directors." On turning the leaf, we find a tabular statement, entitled "The Financial Position of the London Gas Companies." These include the three chief Companies, the Brentford Company, and the Crystal Palace District Gas Company, though why the latter should be considered a Metropolitan Company and the Wandsworth, West Ham, and other Suburban Companies be excluded, we are quite at a loss to imagine. These vagaries, however, are as nothing to the discrepancies between the "information" set out on p. 222 (in the before-mentioned table) and that appearing on the preceding page. We give a list of some we notice:—

	Page 221.	Page 222.
Capital of the three great Companies	Over £19,000,000	£33,901,788
Dividends:		
Gaslight Company	12¾ per cent.	4 1/10 (per cent.)
South Metropolitan Company.	5¼ "	5⅛ "
Price of Gas:		
Gaslight Company	3s. and 2s. 3d.	3s. and 2s. 2d.
South Metropolitan Company.	2s. 1d.	2s. 2d.
Secretary of Gaslight Company .	J. W. Field.	W. Field.
Engineer of South Metropolitan Company	Frank Livesey.	C. C. Carpenter.

We really do not feel called upon to further examine the contents of the book; the sample taken is sufficient to make us hesitate to accept, without corroboration, any statement contained therein with which we were not previously acquainted. We will only remark that the first part of the book is devoted to an exposition of the London Government Act, 1899, which is illustrated by a series of maps—the early efforts, apparently, of a schoolboy.

PERSONAL.

Mr. Robert Morton has been elected a Director of the Crystal Palace District Gas Company, in succession to the late Alderman Layton, of Croydon.

Mr. Fletcher W. Stevenson, M.Inst.C.E., who lately resigned the position of Engineer to the Sheffield United Gaslight Company, has opened an office for consulting practice at 111, Palace Chambers, Bridge Street, Westminster.

The personal estate of the late Sir Edward Frankland, K.C.B., &c., who died on the 9th of August, has been valued at £126,471 net, and the whole of the estate at £138,627 gross. By his will, which is dated May 29, 1899, he bequeaths his freehold property, the Yews, Reigate, and the whole of his chemical instruments and books relating to chemistry to his son Percy Faraday Frankland, who is one of his Executors; the other being Dr. S. West. Among the bequests are £200 each to his Executors, £500 to his "faithful assistant, William Thomas Burgess," and £2000 to his Secretary, Jane Lund.

OBITUARY.

Mr. John Hogg, a well-known and respected resident of Skipton, died on Monday last week, at the age of 69. He had been Chairman of the local Gas Company, and at the time of his death was still a member of the Board.

We regret to record the death of Mr. W. H. Withey, Chairman of the Stroud Gas Company, which occurred on Monday last week, at the advanced age of 88. Deceased was the son of a grocer in High Street, Stroud, and he began to take part in the business when he was only eleven years old. For more than half-a-century he was prominently associated with the public, commercial, and social life of his native town. He commenced by being elected one of the Town Commissioners, and subsequently became a member of the Local Board of Health which superseded that body; and he was upon the Boards of several local institutions and companies. He retired from business about thirty years ago, and was succeeded by his sons, one of whom still carries on the business. Until about six months ago, Mr. Withey was able to move about with considerable celerity; but he then showed signs of a decline in physical strength, and gradually sank. The news of his death was received with widespread regret, for deceased was a liberal-hearted man, and always ready to help in any good and important work for Stroud—rendering that help in an unostentatious way peculiarly his own. The funeral took place last Friday, when ample testimony was afforded of the respect which he had gained for himself from his fellow-townsmen.

The Design of Machinery.—We have received from the Technical Publishing Company, Limited, of Manchester, a copy of the second edition of "Problems in Machine Design," by Mr. Charles H. Innes, M.A., Engineering Lecturer at the Rutherford College, Newcastle-upon-Tyne. The book has been written to meet the requirements of engineering students preparing for the Honours stage of the Science and Art and Technological Examinations in Machine Construction and Mechanical Engineering; and as the former is one of the subjects which candidates for the full technological certificate in "Gas Manufacture" may select to fulfil the conditions under which it is granted, the book may be found helpful to them.

Variations in the Volume of Portland Cement.—At the meeting of the French Academy of Sciences on the 18th ult., M. Considère brought forward the subject of the variations which take place in the volume of portland cement resulting from setting and its hygrometric state. The expansions of cement prisms immersed in water were studied for a period of more than two months; comparisons being made between loaded and unloaded prisms. The expansions increased very regularly, and were much less with a mixture of cement and sand than with pure cement. It appears that, owing to this gradual expansion, metal plates holding cement under water may be submitted to much greater stresses than has been hitherto supposed.

Water-Meters as Waste-Preventers.—At the recent meeting of the Central Water-Works Association at Cincinnati, the above subject came up for consideration in connection with a paper by Mr. J. J. Pater on the municipal ownership of water-works. The author expressed the opinion that water-meters are absolutely essential to conducting water-works on business principles, and, moreover, result in a saving to the consumers. The meter system prevents waste, and thereby preserves the pressure and gives good fire protection. By stopping waste, it greatly reduces the expense of the water-works department, without curtailing the proper use of water. He thought the public should be encouraged to use water liberally; but waste could only be stopped by the meter system. Figures furnished by upwards of a hundred cities showed that those in which meters have been adopted pump only half as much water to supply the public demand as those where the water is distributed under the "rate" system.

Incandescent Gas Lighting for Churches.—In the "Journal" for the 19th ult., we noticed an installation of incandescent gas lighting at St. Saviour's Church, Shanklin. We now learn that the Elie (Fifeshire) Free Church has been lighted by chimneyless incandescent gas-burners supplied by the New Sunlight Incandescent Company, Limited. Those which are placed behind the congregation are fitted with white mantles; but where the light is cast on their faces, the new "Acme" mantles are used. Light for the pulpit is supplied by a cluster of burners in the corona suspended in the middle of the apse, giving abundant light for the preacher without any lamp being near enough to him to interfere with the eyes of the auditory. To complete the novelty of the effect, the burners have been supplied with "Holophane" globes, which so soften the light that the eye cannot detect the luminous point inside. The effect is very pretty, and at the same time in keeping with the church fittings. The beauty of Elie Church, which has already been often admired, is enhanced by its latest decoration, which has an added virtue—that of introducing economy in the gas bill. The same system of lighting is being extended to the new Boys' Hall.

Manchester and District Junior Gas Association.—The Association held their first annual general meeting in the Manchester Technical School last Saturday, when the majority of the members were present, and the following business was transacted: The Council's report was received and the balance-sheet was passed; the latter showing that the organization is in an excellent condition with regard to finances, seeing that they have only been in existence twelve months. The Association began with 18 members, and it is now increased to 40. The following officers were elected: President, Mr. R. H. Garlick (Salford); Vice-President, Mr. C. Berry (Hyde); Members of Council, Messrs. S. E. Halliwell (Littleborough), B. Haynes, jun. (Stretford), W. Hill (Stalybridge), H. Smith (Bury), and W. Baxendale (Chorley); Secretaries, Messrs. E. J. Wellens (Middleton) and A. E. Mottram (Hyde); Treasurer, Mr. R. B. Braddock (Radcliffe); Auditors, Messrs. T. Oldfield and F. Irwin (Denton). A hearty vote of thanks was conveyed to the retiring officers for the admirable manner in which the business of the past year had been carried out; and the proceedings closed. The next meeting will be held on the 14th inst. The afternoon will be spent in a visit to Messrs. J. & J. Braddock's meter-works at Oldham; and in the evening the members will again meet at the Technical School, Manchester, where a paper will be given by Mr. Frank West on "Revivification."

TECHNICAL RECORD.

PROFESSOR LUNGE ON THE DELLWIK WATER-GAS PROCESS.

The following is an abstract translation of a recent communication by Dr. G. Lunge, of Zürich, to the "Journal für Gasbeleuchtung," on Dellwik's water-gas process.

The author's attention was first directed to the system by Herr Dicke's communication on the subject in 1897.* Then Professor Bunte and Professor Vivian B. Lewes reported on the working of the Dellwik plant at Warstein,† and confirmed the statements of the inventor and of the technical men who were exploiting the process, to the effect that by it double the quantity of water gas was obtainable from the same amount of fuel as by the earlier systems, and that this result was secured by burning the carbon to carbonic acid, instead of to carbonic oxide, by means of the air-blast.

The blast or blow has for its object the storing up in a large mass of fuel, by means of the combustion of carbon in air, so many calories as are needed to yield up for a given period the 28,760 calories required for the reaction $C + H_2O = CO + H_2$ (57,560 − 28,800 = 28,760 calories), without allowing the temperature to fall below that at which the above reaction gives place to the undesirable reaction $C + 2H_2O = CO_2 + H_4$, or about 1000° C. (1830° Fahr.). The combustion of carbon by air may take place, as it often does in the earlier processes, chiefly with the production of carbonic oxide, whereupon 12 parts of carbon liberate 28,800 calories. Evidently it is, then, far less favourable than when it happens, as in ordinary processes of combustion, with the production of carbonic acid, whereupon 96,960 calories—or over three times as much heat—are liberated. But, in addition, a considerable portion of the heat of combustion necessarily escapes from the apparatus without utilization, and is not stored up in the incandescent fuel. It therefore becomes clear that the quantity of heat available for the production of water gas, where carbonic acid is formed during the blow, is considerably more than three times that which is available when carbonic oxide is produced. With the gas escaping at a temperature of 700° C. (1290° Fahr.), Herr Dicke calculates that the ratio for the two processes is as 4 to 1. Dr. E. Fleischer, in a special pamphlet, has given the heat produced during the blow, and the quantity of water gas thereby obtainable during the run for intermediate conditions. For the theoretical maximum of 21 per cent. of carbonic acid and 79 per cent. of nitrogen as the product of the blow, and the gas escaping at 800° C. (1470° Fahr.), he finds that 91·2 per cent. of the total heat is utilized, and that a yield of water gas ($CO + H_2$) of 42 cubic feet (0° C. and 760 mm.) per pound of carbon is obtained. Not one of the old processes, with which the blast gases always contain more carbonic oxide than carbonic acid, is capable of yielding more than 32 cubic feet of water gas per pound of carbon. Though Dr. Fleischer did not take account of the change in the specific heat as the temperature rises, the error introduced thereby into his calculations is small, and is nearly negligible, because actual water gas is not a mixture of equal volumes of carbonic oxide and hydrogen, but contains 8 to 10 per cent. of carbonic acid, nitrogen, and hydrocarbons. In any case, it has been shown that the production of carbonic acid, in place of carbonic oxide, in the products of the blow has resulted in a far larger make of water gas being secured.

The following questions, therefore, arise: Why were earlier inventors satisfied with the combustion of the carbon to carbonic oxide? How did Dellwik succeed in producing carbonic acid almost exclusively during the blows? How must the conceptions of the process of combustion hitherto generally accepted be modified, to bring them into line with the newly established facts?

The first question is answered comparatively easily. In order to work water-gas plant in a practical manner—that is, to maintain the reaction $C + H_2O = CO + H_2$ for periods of some minutes' duration without allowing the temperature to fall much below 1000° C. (1830° Fahr.)—there must be a great mass of incandescent fuel; and this must necessarily form a layer of considerable depth. In fact, ordinary water-gas generators have a bed of fuel about 10 feet deep; and though in some instances a shallow bed may be successfully used, in no case can such a generator have a fuel bed less than 40 inches in depth. With such a depth of fuel, the carbon is burnt exclusively to carbonic oxide, as in innumerable Siemens gas generators or producers. The small quantities of carbonic acid found in Siemens or producer gas, are due to leaks or cracks in the generator, which admit air, as the gas immediately above the bed contains only carbonic oxide. It is generally assumed that at high temperatures—1000° C. and upwards—the carbon is burnt primarily to carbonic oxide for the most part, as carbonic acid tends to decompose at such temperatures. But even if this assumption be incorrect, and carbonic acid is primarily formed entirely or partially, it will be reduced to carbonic oxide in passing up through the deep layer of incandescent fuel. Thus the action of all ordinary gas-generators is explained. In these, the so-called producer or Siemens gas—a fuel consisting chiefly of carbonic oxide (with the unavoidable atmospheric nitrogen)—is produced; and in the old water-gas processes it was also inevitably generated during the blows, though here the producer gas was frequently a troublesome and valueless bye-product. In the water-gas generator of the old type, the same conditions prevail as in the Siemens producer—viz., a temperature of 1000° C. and upwards, and a deep bed of fuel, often even deeper than in the Siemens producer.

From the above, it is evident why the inventors of the old water-gas processes were resigned to the immense loss which results from forming carbonic oxide in place of carbonic acid during the blows. It was accepted as inevitable. The carbonic oxide, or rather the producer gas, obtained during the blows theoretically could be utilized; but, as a matter of fact, its utilization has been attended with many difficulties. Apart from the technical difficulties which have to be overcome, generally there is not, in places where the water gas is required, use for four times its volume of producer gas; and leading the latter to a distance for consumption, is out of the question. Moreover, the quality of the producer gas is not sufficiently uniform for many applications. Where the author has observed water-gas plant, he has always seen the producer gas wasted by being burnt as it escaped from the apparatus. It is well known, however, that in some places—such as Hörde, Wittkowitz, &c.—the producer gas is wholly or partially utilized; but it is equally well known that in many instances its utilization has been discarded, and that at the present time it is attempted only in exceptional cases. Mixing the producer gas with the water gas has been suggested; but wherever such a mixed gas is useful, it may be produced more simply and directly by the "semi-water-gas" processes, in which air and water are introduced simultaneously into the generator. Thus it happens that water gas which ten or fifteen years ago was styled the "fuel of the future" did not substantiate its claim to that title.

Before a similar claim is made on behalf of the water gas obtained by the Dellwik process, we must consider the second of the questions set forth above, and ascertain how this process attains results quite different from those of the earlier ones. The author could not find in published matter the requisite information for answering this question; and he therefore applied to Herr Dicke, the Chief Engineer of the Dellwik Syndicate, who invited him to investigate the process by examination of the plant at Warstein. This invitation was gladly accepted by the author, who was assisted in his investigations by the chemists on the spot.

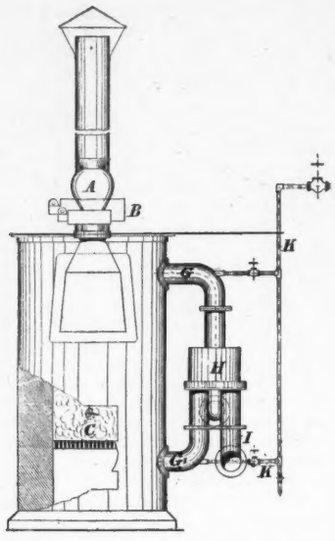
The author satisfied himself at once that the difference between the Dellwik and the old processes did not depend on the pattern of the generator, which differed but slightly from earlier ones, and appeared likely to yield carbonic oxide merely, when the air-blast was applied. It was, however, essential that the bed of fuel should be maintained of unvarying depth, so that a constant ratio between the depth of fuel and the pressure of the air-blast could be secured. The generator has naturally undergone some modifications dictated by experience in working; and the annexed figures illustrate the latest pattern of generator for a make of 3500 to 4250 cubic feet per hour. Other sizes are made, having capacities ranging from 880 to 23,000 cubic feet production per hour. At Warstein there are 26 examples of the plant, having an annual output of 1060 million cubic feet.

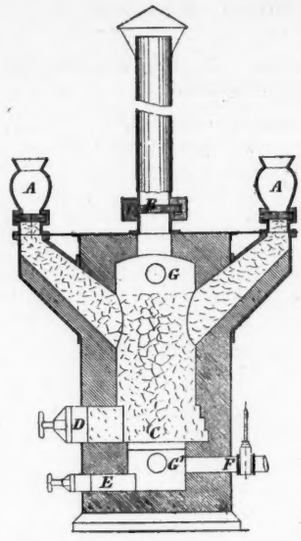
In the illustrations (next page), A are the charging-hoppers, with sliding-valves. These hoppers are charged, at intervals of half-an-hour, up to the level of the valves; and thus the fuel in the body of the generator is kept constantly at the same height. In the generator illustrated, the bed of fuel is 4 feet deep. B is the slide in the chimney, C the fire-bars, D the clinkering door, E the ash-door, F the blast-pipe from the fan, G the upper water-gas exit-pipe, G^1 the lower water-gas exit-pipe, H the reversing valve by means of which the water gas is alternately taken off at the top and at the bottom of the generator, J the gas-pipe leading to the scrubber, and K the steam-pipe which naturally supplies the top and bottom of the generator in turn.

The author's observations began on June 1, 1899. The heat had been got up in the generator previously, and manufacture was commenced at 8.38 a.m., and continued without interruption until 2.22 p.m. The bell gasholder, of which the capacity was checked by the author, was at its lowest point. Its position was noted after each operation; and after three runs, when it was nearly full, its contents were blown off. Coke was supplied to the generator in weighed quantities, also after every three runs; and at the conclusion the level in the generator was made as nearly as possible the same as at the start. In all, 26 runs of from 8 to 10 minutes' duration were made; while the intervening blows were each of 1¾ minutes' duration. The admission of steam, and consequently the take off of the gas, was changed from top to bottom of the generator for alternate runs. During the blows, pressure observations were made frequently, both in the blast-pipe at its opening below the fire-bars, and on the products of combustion above the bed of fuel. The pressure of the blast was thus found to vary from 9·6 to 10·2 inches, and that of the products from 4·1 to 4·5 inches. There was thus a drop in pressure of 5·5 to 5·7 inches. The Le Chatelier pyrometer was out of order; and consequently the heat can be stated only as "bright red" throughout.

During the blows, the exit gas was tested as frequently as possible with Hempel's apparatus, in order to ascertain the proportion of carbonic acid present in it. No considerable

* See "JOURNAL," Vol. LXX., p. 897.
† *Ibid*, Vol. LXXI., p. 1127, and Vol. LXXII., p. 580.





difference was found in the proportion present at the beginning, the middle, and the end of a blow. The minimum proportion of carbonic acid was 17 per cent., which was found only once. Other estimations ranged from 17·8 to 18·2 per cent.; but once 19·5 per cent. was found. More complete analyses showed the presence of a little—*e.g.*, 1·4 per cent.—oxygen; but cuprous chloride did not indicate with certainty the presence of carbonic oxide, and therefore only traces of this gas could have been present.

The total consumption of coke was 540 lbs.; and the gas made was 24,800 cubic feet, or nearly 46 cubic feet per pound of coke. The gasholder stood in the open, exposed to the sun's rays; and reduction of the volume of gas to normal conditions of temperature and pressure could not be made with accuracy. If an extremely large reduction be made on this account, it may be taken as certain that a make of 40 cubic feet at 0° C. and 760 mm. was obtained per pound of coke. It was not practicable to analyze the water gas while the trial was taking place; but a sample was taken with every precaution, and subsequently analyzed by Dr. Hausdorff, with the following result:—

	Per Cent.
Carbonic acid	4·65
Hydrocarbons (C_nH_{2n})	0·05
Oxygen	0·20
Carbonic oxide	39·65
Marsh gas	0·82
Hydrogen	50·80
Nitrogen	3·83
	100·00

The analysis indicates that the sample was quite a normal specimen of water gas. It should be pointed out that, during the runs, the gas was passed into the holder as long as a small stream issuing from a pet-cock burnt freely. When the flame began to diminish in size suddenly, owing to the presence of much carbonic acid and steam in the gas, the steam supply was cut off, and the blast was turned on.

The author satisfied himself by independent observation that during the blows the carbon was burnt to carbonic acid, and not to carbonic oxide as in all the earlier processes. As a direct result of the greater heat thus obtained, the blows were enormously shortened; being only of 1¾ minutes' duration, instead of about 10 minutes as formerly, while the runs were prolonged from about 5 minutes to 8 or 10 minutes. Another necessary consequence was that much less coke was consumed in raising the heats, and much more in gas production, so that actually about 2½ times as much water gas was obtained as by the older processes.

It is evident that these very substantial improvements on the old processes have not been effected by any change in the pattern of generator. The differences observed can only ensue from the very much greater fall in pressure which is secured during the blows in the Dellwik process. A somewhat greater or less initial pressure does not affect the result, as differences of 4 or even 8 inches of water pressure (say, ¼ inch of mercury) lie within the fluctuations of the barometric pressure at any spot, and, of course, well within the variation between places of high and low altitudes. Nevertheless carbonic oxide (not carbonic acid) was always obtained formerly, even with beds of fuel of a depth of 4 feet or less. The pressure in the blast-pipe has to be so adjusted to the height of the bed of fuel and the nature of the fuel, that a certain drop in pressure occurs, and that thereby a certain rate of flow of the air-current is secured—such rate of flow being much in excess of that formerly attained. An observation made in Warstein two years ago confirms this view. A generator of the type then in vogue had been erected, and an attempt was made at first to work it with a fan which gave an air-blast of only 6 inches pressure. The results were unsatisfactory, as the exit gases contained only 10 to 12 per cent. of carbonic acid, and the make of water gas was only about 24 cubic feet per pound of coke. At Dr. Fleischer's suggestion, a more powerful fan, giving an air-blast of 12 inches pressure, was adopted; and the percentage of carbonic acid in the exit gases, and the yield of water gas, at once rose to the amounts now recognized as normal For this and other improvements made on the original plant, Dr. Fleischer has been responsible; and the process is now designated the "Dellwik-Fleischer."

We come now to the third question—viz., What alteration must be made in the prevailing theoretical conception of the process of combustion in gas-generators in order to adapt it to the indisputable fact that, by simply increasing the pressure of the blast, notwithstanding the deep bed of fuel, the reaction $C + O = CO$ is avoided and the reaction $C + O_2 = CO_2$ is secured? The only answer that can be offered is the following: With a slight drop in the pressure—*i.e.*, such as does not considerably exceed that which will overcome the frictional resistance—carbon at temperatures over 1000° C. burns, as is well known, almost exclusively to carbonic oxide; and carbonic acid formed near the fire-bars is reduced by the overlying incandescent carbon to carbonic oxide. Thus only carbonic oxide escapes at the top. The reason why the reaction $C + O = CO$ occurs at temperatures above 1000° C., almost to the exclusion of other reactions, is that at higher temperatures carbonic acid is decomposed, thus $CO_2 = CO + O$. Therefore carbonic acid cannot be among the ultimate products, especially if excess of carbon is present to combine with the liberated oxygen to form carbonic oxide. But the tendency of carbonic acid to decompose not only depends on the temperature and the excess of carbon, but also on the excess of oxygen. If, with the necessary conditions of temperature, mass of carbon, and depth of the bed of fuel, there is introduced in unit time a very great excess of oxygen, then another equilibrium results. The point at which carbonic acid decomposes is raised above the temperature which prevails in the apparatus, and the reaction $CO_2 + C = 2CO$ can no longer occur. The excess of oxygen does not permit of the action ceasing at that stage, but effects the combustion of the carbonic oxide to carbonic acid.

A tenable theory can only be formulated by recognizing the difference in the rate of flow of the stream of air in the Dellwik and earlier processes, or more precisely the difference in the amount of oxygen passed in unit time over a given area of incandescent carbon. But unfortunately the determination of the amount of oxygen, and even the far simpler problem of the determination of the difference in the rate of flow, cannot be solved at the present time. It would be illusory to attempt to calculate the rate of flow from the drop in pressure, firstly because the change of temperature of the gas within the generator must influence it very greatly, and secondly because of the exchange of oxygen between the carbonic acid and carbonic oxide. Too little is known of the temperatures which prevail in different parts of different generators; and even if this information were more complete, the calculation would be a very complex one, and would not be reliable, because of the many minor conditions which could hardly be taken into account.

Provisionally, therefore, it is not possible to say that, in order to effect the combustion of carbon to carbonic acid above 1000° C., and with a deep bed of fuel, a certain specified amount of oxygen or rate of flow of the air must be used. For the present, it must serve, for each size of generator, to determine empirically by analyses of the gases the pressure of blast which is needed, with the given depth of the bed of coke or anthracite, to effect combustion to carbonic acid.

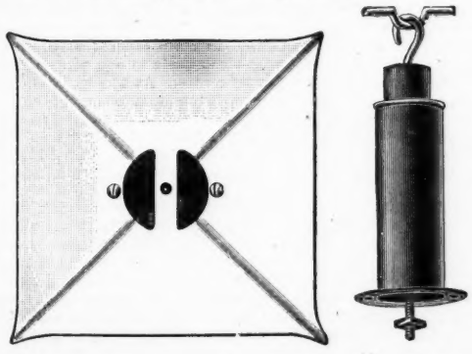
By the Dellwik process, about 80 per cent. of the heating value of the fuel used is obtained in the water gas (ignoring the heat in the escaping blast gases, which might be partially recovered), compared with about 45 per cent. with the older processes. In consequence of the small yield by the latter, and the

fact that only coke or anthracite was a suitable fuel, water gas had only been rationally applicable as a fuel gas in cases where its special properties were valuable—for instance, where its very small, but extremely hot, flame could be specially utilized. Its use for illuminating purposes rested on other grounds, as a high illuminating power was imparted to it by means of heavy hydrocarbons. In Germany, however, the use of water gas for lighting has been chiefly by means of incandescent combs and mantles. Water gas, made by the Dellwik process, being only half as costly as it hitherto was, clearly has an immense future in such applications; and it will be used extensively for adding to ordinary illuminating gas. As a fuel gas, it will no longer be a luxury; but solid fuel can be converted to it and utilized in the many ways in which it is now recognized that gaseous fuel is more advantageous than the direct combustion of coal. As it has a calorific value of about 85 calories per cubic foot, it could be economically conveyed to far greater distances for use than can producer gas. Where the latter, containing about 30 per cent. of carbonic oxide, has been used, there can be no hygienic objection to the use of water gas containing about 40 per cent. of carbonic oxide. But where water gas has to compete with coal gas, which contains at the most 10 per cent. of carbonic oxide, safe means and ways must be found by technical men to remove hygienic scruples, due to its higher percentage of carbonic oxide and the feebleness of its odour. A powerful odorizing agent—such as carbylamine or mercaptan—meets the chief objection. Hygienic opposition has still less force when water gas is carburetted with naphtha or benzol, for addition to coal gas for illuminating purposes. Whether the gas contains 10 per cent. or 15 to 20 per cent. of carbonic oxide, is of little consequence for such use, as the requisite odour is in this case already supplied to it.

THE CONVERSION OF PUBLIC LAMPS FOR INCANDESCENT GAS LIGHTING.

To ensure success in incandescent gas lighting in streets and other open spaces, a requirement of the first importance is a suitable lantern. When changing from the old flat-flame form of lighting to the incandescent system, if a local authority be wealthy and not parsimonious in expenditure on improving the district, they will in all likelihood go in largely for some of the new lanterns which have been specially designed for the purpose, and which are far removed in appearance and effective performance of their duty from the old-fashioned types of lamps which still disfigure our streets. The box-shaped lantern, with slightly elevated top, surmounted by nothing more ornamental than a plain knob, and set in the hideous shadow-throwing cradle, is certainly an abomination in the sight of all who lay the slightest claim to an artistic taste. But it is not given to all local authorities to rule over a richly populated area, and to have plenty of money at command wherewith to sweep away at will such eyesores; and even in wealthy cities and towns it might not be prudent to altogether discard the old lamps, and incur a heavy expenditure on new ones for narrow and little-used by and back streets. Therefore in and for such places, the best must be made of the lanterns already in existence when it is decided to improve the lighting by adopting the incandescent system.

Numerous have been the devices which we have met with in our travels for bringing old lanterns up to the condition required for protecting incandescent mantles from wind and rain, and for securing the best possible service from them. Some of these expedients have answered fairly well; others have failed to compass the desired end. One of the most effective arrangements to which attention has been called for rendering old lanterns suitable for the reception of incandescent mantles has been brought out by Messrs. H. Greene and Sons, of 19, Farringdon Road. It is simple and moderate in cost; its trial during the past twelve months or so has proved its effectiveness; and it admits of the ready conversion of lanterns at home by any gas-works hand. The last point is an important one.



The accompanying illustration shows the new parts essential for effecting the conversion. These are made of steel; and the portion shown on the left is enamelled white on its under surface. It is fixed at the top of the body of the lamp, and serves a twofold purpose: It acts as a reflector, and converts the lantern into a double-chambered one. It is slightly concave in form; and the corners, as may be observed in the engraving, are tapered, so as to leave a narrow space almost the full length of each side for the passage of the air from the top to feed the burner and support combustion—the manufacturers preferring that the bottom of the lantern should be entirely glazed. In the centre of the reflector a circular aperture is provided as shown, and above this is fixed a chimney (the right-hand portion of the illustration) for conducting away the products of combustion, and keeping them apart from the incoming air. The whole of the arrangement is kept in position by means of a rod passing through the chimney, and supported on a cross-rod fixed in the ventilating-holes in the upper part of the top of the lantern. It will thus be seen that the air passing in for the supply of the burner and flame must impinge on the chimney and upper surface of the reflector, and thereby become heated; and that, the admission openings being equal on all four sides of the reflector, a uniform distribution of air in the lantern is secured.

By a little further expenditure, additional improvements may be effected. For example, in the roof of the lantern tin blanks may be inserted, with strips of glass along the bottom; a fine opening being left for the admission of air where the tin overlaps the glass. Then the unsightly cradle may be dispensed with by forging a bolt on to each bottom corner of the frame, to enable it to be fastened by nuts to the frog on the standard. If alterations to this extent are undertaken, clips may also be provided on the inside of the lantern frame for the support of the reflector in place of the hooked rod. The fittings for effecting the conversion of lamps in the manner described are made for 14-inch and other sized lanterns. Where clips are used for support, the reflectors may be made of circular form, and in one piece; and they can be fitted to either square or circular lanterns. The arrangement, it may be mentioned, has been extensively adopted in South London. We have seen some lanterns which Messrs. Greene and Sons have converted for a Suburban Gas Company, and can testify to their enhanced utility for the purpose for which they are intended, and to their smarter and more modern appearance. The reflector and chimney have also been adapted to some of the new types of lanterns made by the firm.

THE SOUTH-EASTERN COALFIELD.

At the recent meeting of the British Association at Dover, two interesting papers on the above subject were read in the Geology Section. The first was by Mr. R. Etheridge, and dealt with the relation between the Dover and Franco-Belgian coal basins; the second was by Professor Boyd Dawkins, F.R.S., who confined his remarks chiefly to the geological features of the work now going on in the south-east of England.

Mr. Etheridge opened his paper with the statement that the history of the stratified rocks of South-East Kent was now in a fair way of being fully determined. The Dover exploration had been carried through the lower cretaceous, jurassic, and probably the upper series of the coal measures, with, so far, eight seams of workable coal, to the depth of 2225 feet. How many more seams there were was not certain; but over 100 feet of the coal measures below the thick or 4-feet seam had been tested, and yet the coal-measure floor had not been penetrated. The discovery of these coal measures proved completely Godwin Austen's view of forty years ago (in 1858) that the coal measures which form part of the line joining the coalfields of Westphalia, Belgium, and North France with those of Bristol, North Somerset, and South Wales lie buried beneath the newer rocks in South-East England. The future commercial value to Dover and its neighbourhood might be inferentially seen from the fact that in 1850 there were only two collieries in the Pas de Calais field producing annually 19,000 tons; while in 1895 there were 17 collieries producing upwards of 11 million tons. Comparing by maps, plans, and statistics of borings the coalfields of Brabourne and Dover with those of Belgium and South Wales, Mr. Etheridge showed, first, that Professor Prestwich's view was probably correct—viz., that the Dover field is one of a chain of isolated coal basins extending from Prussia to the south of Ireland, and passes under the Straits of Dover; then that the coal at Dover was workable at a depth comparing very favourably with, and indeed much less than, the depths worked in South Wales and Belgium; and, thirdly, that in the quality, chemical composition, and heating power of the anthracite and other kinds obtained in Wales, Somerset, Dover, and the Franco-Belgian fields the agreement was almost complete, while a like agreement existed in the similarity of mass and condition of the beds and their relation to the strata above and beneath. He said the continuity could not be doubted, as in every particular the fields were the same throughout. Nor could success be doubted if one considered the known great capacity of the French and Belgian fields, and the determined scientific manner in which they had been developed. The significant question was: Were the coals at Dover able, in respect of the depth and quality of the coal, to be worked at a profit? The answer was that eight seams had been reached, the lowest 4-feet seam being 2225 feet; and many coalfields were worked at much greater depths—4000 feet being the depth fixed by the Royal Commission of 1871, under the presidency of

the Duke of Argyll, as the limit of safe working, on account of the underground temperature at that point being 98° Fahr., or blood heat. Therefore, there was every indication of the possibility of profitable working of the Dover coalfield; and it was a matter not only of scientific, but of national and commercial interest.

Professor Boyd Dawkins, after a few introductory remarks as to the value of the discovery of coal in the south-east of England, said the first boring to be noticed was at Ropersole, a spot near the highway between Dover and Canterbury—eight miles from Dover, at 400 feet above Ordnance datum; the surface being composed of upper chalk, with a thin stratum of clay with flints. It was begun at the close of 1897, and had pierced the strata to a depth of 1773 ft. 7 in. In his opinion, the coal measures of Ropersole were a portion of the same series as those at Dover. Here, as at Dover, the question of seams of coal resolved itself probably into a question of sinking deeper. Only two unimportant seams had been met with in a thickness of 197 feet. Then twelve seams were penetrated in a thickness of 1054 ft. 6 in.; the thickest 4-feet seam being at the bottom. The Ropersole boring established the fact that the Dover coal measures extended northwards for a distance of eight miles and beyond in the direction of Canterbury. The coal measures set in in Kent at a sufficient distance to the north-east of Brabourne to allow of the presence of the carboniferous limestone and millstone grit. These probably dipped at the same high angle as the Devonian below. Their south-western boundary could only be accurately defined by further borings, such as those which were being carried on at Ottinge, about 2½ miles to the north-east of the scarp of the downs, and 6 miles to the south-west of Ropersole. Their range to the north and the east still remained to be proved. They were, however, continued under the Channel, and had been proved by the boring at Calais in 1850, as well as those carried out in 1898 at Strouannes, near Wissant. In this district, they were clearly shown by other borings to be faulted into the Devonian and other pre-coal-measure rocks. The thickness and value of this south-eastern coalfield could only be estimated by the exposed coalfields of Northern France and Belgium and of Somerset. That of Liége was 7600 feet thick, and contained 85 seams, presenting an aggregate thickness of 212 feet of workable coal. That of Mons was 9400 feet, with 110 seams, yielding 250 feet of coal. In Somerset the coalfield was 8400 feet thick, the seams were 55 in number, and yielded 120 feet of available coal. It was obvious from these figures that the possibilities of the south-eastern coalfield were very great, although it still remained to be proved how far these vast thicknesses of rock had been denuded in Kent before the deposition of the triassic and jurassic rocks. In summing up, the author said the results of these borings were likely to bring about the same economic revolution in Kent as was brought about in France by the extension of the coalfield of Valenciennes and Mons, about 95 miles to the west of its original outcrop at the surface, and to within some 30 miles of Calais. The coalfield had been proved at Dover. Its range for eight miles to the north had been also proved at Ropersole. Its southern boundary, as yet ill defined, was marked by the Pembroke-Mendip anticline, ranging under the southern scarp of the chalk downs. Its range in other directions was unknown, and awaited further investigation. To the south of this anticline the palæozoic floor was probably composed of pre-coal-measure rocks. If, however, the coal measures did occur, they were buried under such great thicknesses of superincumbent rock—largely sands and loams full of water—that it would be difficult to work them. They knew now by experiment, not only where to seek, but also where it was advisable not to seek for the coal measures. The difficult problem of the buried coal measures in South-Eastern England, now being worked out by private enterprise, was likely to add greatly to the resources of the country, as it had already added to the wealth of geological knowledge.

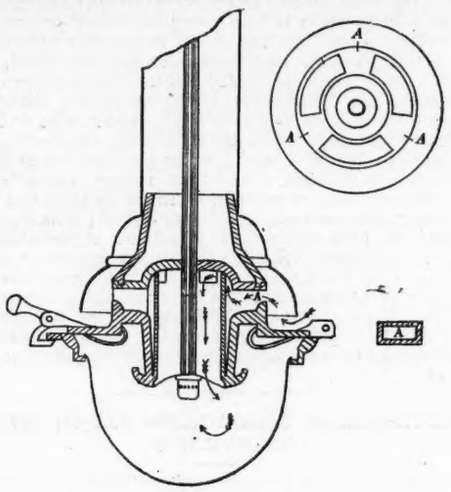
The President (Sir Archibald Geikie), in inviting discussion on the papers, remarked that there were two distinct points of interest—first, the commercial value of the coal fields in question; and, secondly, the geological question of the remarkable variations of the strata above the coal measures. Questions having been asked as to the temperature gradient, the quality of the coal found, the presence of lignite, and as to whether such bituminous coal as that of Dover was found in the South Wales field, Mr. Etheridge replied that chemical analysis showed that the Dover coal was of the same quality as that found in the other fields. Professor Boyd Dawkins observed that there was good blazing coal, as well as steam coal and anthracite, obtained in South Wales exactly corresponding to that of Dover; that he had not found any lignite in the Dover coal measures, but some in the secondary rocks (the oolites) above; that no temperature observations were possible in the borings; and, finally, in respect of the depths of the coal measures, that he was of the opinion that the seams reached at Dover formed only the upper part of the measures, which were 7200 feet thick at Westphalia, and reached 7600 feet at Liége.

The Gas Committee of the Belfast Corporation have just entered into a contract for the supply of 6000 tons of Russian Solar oil at 3¼d. per gallon.

REGISTER OF PATENTS.

Recuperative Gas-Lamps.—Brown, A. O., and Allen, W. A. G., of Bloomsbury Street, W.C. No. 19,986; Sept. 21, 1898.

This invention relates to an improved form of the recuperative chamber of inverted argand burners, which are made in one piece, with radial passages or ducts for the admission of the cold air. These currents of air in their passage become initially heated, and are intercepted by a cylindrical partition which causes the air so heated to ascend. It then becomes more intensely heated, and is drawn through ducts in the cylindrical partition, from which it descends to the burner in a highly-heated state, and intermingles with the inflowing gas.



The lamp illustrated is of the usual form, and represents the air-passages A, the shape of which is shown in the detail. The oblong shape is said to give a greater heating surface to the inflowing air in its passage to the recuperative chamber than has hitherto been employed. The heated products from the flame pass through the openings formed by the passages A to the chimney, and in their passage impart heat to the inflowing air. A cylindrical partition extends to the top of the heating chamber, where ducts or passages are formed. The air, in its passage through the ports A, is intercepted by the partition, and is drawn upward, and in its passage becomes more intensely heated before descending to the flame, where it intermingles with the inflowing gas, and produces an "intense white light."

Water-Gas Producers.—Dymond, J., of Crediton, Devon. No. 20,451; Sept. 27, 1898.

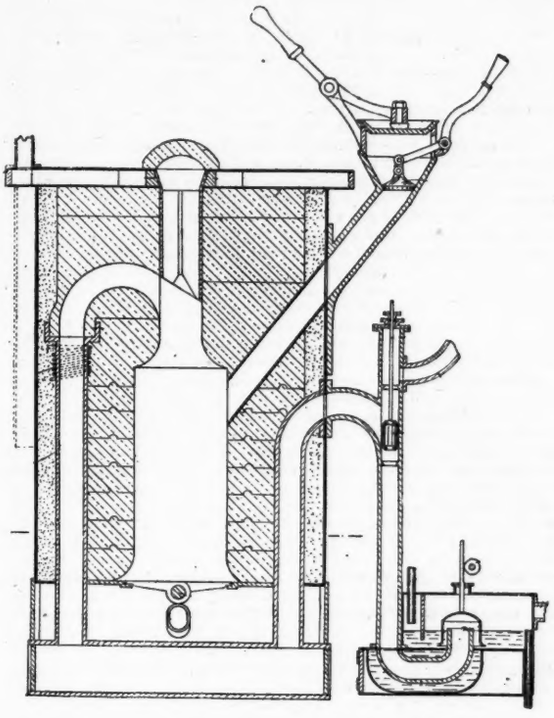
According to the cross-section of this producer shown in the engraving, it will be seen that it is constructed with a superheater arranged above the discharging end of the hopper, so as to superheat the escaping gas, and with a divided top adapted to form a heater for the air supplied to the producer; the gas escaping from the superheater passing into outlet-pipes located vertically in the lining of the producer, and communicating with a depositing chamber below the fuel chamber—the outlet end of the discharge-pipe being preferably connected to a pipe provided with a water-sealed non-return valve.

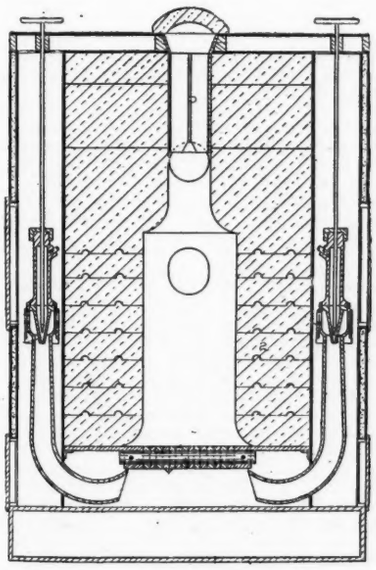
The producer itself is an approximately cylindrical metal shell, lined internally with fire-brick from the bottom up to the normal height of the fuel, or to the lower end of the charging-hopper. The fire-bricks employed are formed each with a V-shaped projection that enters a corresponding notch in the adjacent face of the next brick (as referred to in patent No. 22,066 of 1897), and also with a projection on the upper or lower face that enters a corresponding notch or groove in the adjacent face of the next upper or lower brick. Above the normal height of the fuel, there is a fire-clay or brick lining that forms a superheating gas-passage, and tapers in from the feed point or hopper end in such a manner as to reduce the internal diameter of the gas-passage or superheating device below the crown—the contracted part or superheater being in such close proximity to the fire that the heat is retained, and good generation of gas obtained. The contracted crown is made in sections and bound together with metal rings or cramps, instead of being made in one piece—for more effectually withstanding the heat. Above, and in close contact with, the superheater is a fire-clay or brick outlet-block made in one piece or in parts, and provided with holes through its centre. At the back, and directly around the holes, the block is provided with a collar or boss, to fit inside a metal outlet-pipe, enlarged at this point to receive the collar or boss; or the boss may be adapted to be bolted to a flange on the pipe. The outlet-block and the crown are bound together by metal rings. The outlet-pipe is arranged at an angle with the shell, or it may extend through the top; but advantageously it passes down inside the cylindrical shell close to, or (as shown) partly within, the fire-brick lining, and is connected to a double bottom, from which point the gas is withdrawn. The outlet-pipes are enclosed in some bad conductor of heat; and they may, if desired, be lined with refractory material. The end of the outlet-pipe is connected to a vertical pipe having at its extreme end a hydraulic valve-box, the valve of which is bell-shaped, and provided with a rack and pinion or other means for operating it. The valve covers the end of the gas inlet-pipe, and is located within the box, which contains water that seals the valve when it is in its lowered position, so as to prevent escape of gas. It also serves to prevent back-pressure when the generation of gas is stopped. The hydraulic box has a continuous water supply-pipe and an overflow-pipe, to keep the water-seal at the required height.

The fuel-hopper is of angular shape, fitted with two valves, the top one of which is adapted to turn back clear of the hopper-head for feeding. It

is mounted at its centre on a carrying lever, so as to allow of its being rotated for the purpose of grinding it on its seating in order to obtain a gas-tight fit. The lower end of the hopper-head is normally closed by the valve, which is a lift-valve capable of being operated by a lever and link. The hopper is fixed on one side of the generator close to the crown, and carries the mechanism for operating the several valves.

The top of the generator is made of two metal plates separated by an outer ring, a central ring, and division-pieces bolted together; the top being provided with air inlet and outlet ports. The air is directed through curved passages formed between the division-pieces, so as to be heated by its passage between the plates, after which it enters vertical pipes by which it is delivered into the ash-pit below the fire-bars. The top plate is provided with a central hole (for use in removing clinker) fitted with a valve having a fire-clay extension secured thereto, and so shaped at its lower end as to direct the flow of gas towards the passage in the outlet-block.





The air supply may be taken from the space extending partly around, or in proximity to, the gas outlet-pipe, and after passing through the curved passages be delivered to the vertical pipes or passages, each of which is provided with an injector. Each steam and air injector-tube is provided with air inlets or ports controlled by vertical regulating-plates, so as to admit of more or less air being supplied as may be found necessary for the proper production of the gas. The air-injector is provided with a steam injector or nozzle, with regulator attached, as described in the former patent. The inner end of the steam and air injector-tube is inclined towards the centre of the burning fuel, and made in such a manner as to prevent coal ash or clinker impeding the continuous flow of the injected steam and air.

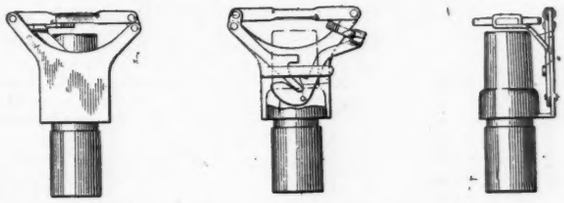
A steam superheating coil or pipe is fixed inside the outlet end of the gas outlet-pipe, as in the construction of the gas-producer shown in the earlier patent, or the coil may be arranged to surround the upper end of the outlet-pipe as here shown; the connecting-pipe from the superheater to the injectors being covered with an outer metal shield to prevent condensation, or being led through the hot-air passages to the injectors. The second or special bottom referred to above serves to superheat the steam and air injected into the ash-pit, and "admit of the generator being worked economically as regards consumption of fuel, with little or no formation of clinker, and with a clear bright fire."

Incandescent Gas-Burners.—De Léry, J. B., of New York. No. 12,150; June 10, 1899.

This is another modification of the invention of the same patentee—see "JOURNAL" for July 14, 1896 (p. 75), July 20, 1897 (p. 167), July 27, 1897 (p. 219), May 3, 1898 (p. 1012), Feb. 14 last (p. 376), June 27 last (p. 1747), Aug. 15 last (p. 432)—and it more especially relates to improvements in processes for forming the already described incandescible fabric into tassels for incandescent gas-lights. As heretofore made, the coils of the tassels have been open at the bottom; whereas, in the present invention, they are formed of coiled loops in such a manner that the bend of the loop forms the bottom of the tassel. It is claimed that this construction materially reduces the liability of disintegration at that part of the tassel, without diminishing the incandescence when the tassel is heated by a gas-flame.

Igniting Device for Gas-Burners.—Sterne, A. J., of New York. No. 12,481; June 15, 1899.

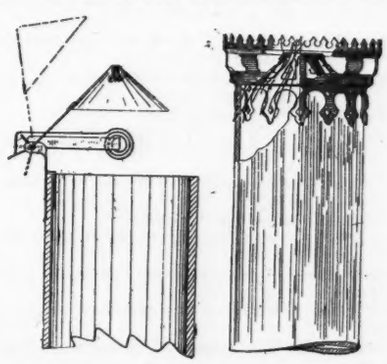
This invention consists (as shown) of a support moveable on the burner to carry a platinum igniter to and from the gas-jet, and a thermostat near the jet connected to the moveable igniter-support, so that the igniter, being normally in igniting position, will ignite the gas when turned on, and the heat of the flame will then expand the thermostat and remove the igniter from the flame, and when the gas is extinguished the resulting cooling and contraction of the thermostat will return the igniter to its original position.



An important feature of the invention is the movement of the igniter to and from a position close to the jet-orifice; so that it will be in a comparatively cool place when removed from the flame, and will not interfere with the radiation of light. Other features of the invention are: The rigid metallic bar used as the thermostat, and its location close to the jet-orifice in the path of the gas, so that it will heat and expand quickly and strongly without distorting the flame or obstructing the light; the moveable igniter formed of a platinized porous body having fine multiple platinum wires or gauze laid in contact with it so that certain ignition is assured; the positive mechanical connection between the thermostat and the igniter, so that the device will work in any position; the arrangement of the thermostatic bar edgewise toward the gas-jet orifice, so as not to distort the flame; and the intermediate connecting lever between the igniter-lever and the thermostat, by which the removal of the igniter from the flame is fully obtained with a small and sightly igniting-device.

Automatic Lighter for Gas-Jets.—Müller, A., of Berlin. No. 13,308; June 27, 1899.

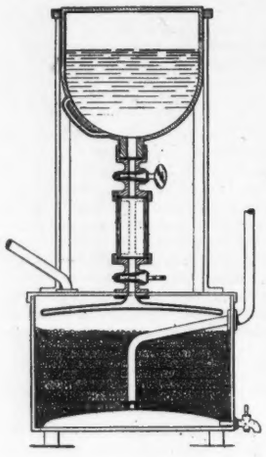
This lighting-device differs from others of like nature heretofore employed in that a spiral spring elongating under the influence of heat, and contracting while cooling, is employed for moving aside the inflammatory material from the lighting point, in order to place it out of the path of the ascending heat when the burner is alight. The spiral spring does not, however, carry, as in existing constructions, the lighting material at its free end, but serves to transmit the movement consequent on its expansion and contraction to a lever which carries the lighting material at its free end, and which, at the time of corresponding movements of the spring, returns the inflammatory material to the middle of the chimney of the lamp, or removes it aside out of the heat current.



The illustration represents a sectional elevation of the apparatus applied to a lamp-chimney, and a cap applied to the chimney for directing the gases directly on to the lighting material.

Producing Gas Suitable for Incandescent Lighting and Heating.—Nicolai, L. J. F., of Dresden, and M'Nab, A., of Menstrie, N.B. No. 13,723; July 3, 1899.

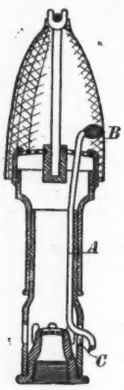
This invention relates to apparatus by which gaseous vapours combined with air can be produced, in an arrangement such as that shown in the engraving, for general incandescent lighting and for heating purposes.



The patentees propose to employ an absorbent solid material—as, for instance, infusorial earth (kieselguhr), saturated with liquid and "fugitive" hydrocarbons in an arrangement of apparatus which will allow it to be slightly oversaturated with hydrocarbons, and through which oversaturated material a current of atmospheric air is passed, so as to take the finely-divided particles of the surplus hydrocarbon with it, and form in this way a burning gas. The apparatus consists of two reservoirs connected by a tube having two valves on it, and being at its lower end joined with a spreader inside the reservoir. The two reservoirs contain the saturated solid material and the oversaturating fluid respectively; and pipes fitted to one of these passes air into, and through, the oversaturated material, while the other guides the gas to the burners.

Automatically Lighting Gas.—Fröhlich, B., of Reudnitz, Germany. No. 14,444; July 13, 1899.

This automatic gas-lighter consists of a globe or equivalent device of platinum wire maintained at a suitable temperature by a bye-pass flame, and exposed to the main gas-jet, so that, when the latter is turned on, the temperature of the globe is raised and the gas is ignited. A convenient way of carrying out this object is to surround the outlet of a small pilot gas-jet with a small globe or netting of fine platinum wire, so that the flame is contained within the globe. A flame the size of an ordinary pin-head will be found sufficient; and the globe need only be the size of a pea. By this means, the platinum is maintained at a sufficient temperature (say) a low red heat.



The engraving illustrates the application of the device to an ordinary incandescent burner. A is the bye-pass gas-pipe, which may enter the casing of the burner through the opening C, and has its upper end enclosed in the fine platinum-wire globe B. Where the globe touches the mantle, a fine platinum wire (or a line drawn in a suitable solution of a platinum salt) extends to the top of the mantle, and to the bottom of the mantle as well, if desired. The pilot-flame within the globe B maintains the latter at such a temperature that, when the main gas-jet is turned on, the globe becomes sufficiently heated to light the gas.

When first starting, the main burner is lighted in the usual manner; the main tap is then turned off; and the platinum globe is maintained at the required temperature by the bye-pass flame. When the main gas is again turned on, the globe becomes a bright red and ignites the gas, either alone or in conjunction with the fine line referred to in the case of an incandescent gas-burner.

APPLICATIONS FOR LETTERS PATENT.

18,777.—Ingleby, J., and Simon, H., "Worm-conveyors." Sept. 18.

18,781.—Crossley, W. J., and Atkinson, J., "Internal combustion motors and blowing engines." Sept. 18.

18,800.—Nordmann, R., "Production of incandescence bodies." Sept. 18.

18,824.—Voelker, W. L, and The Voelker Incandescent Mantle, Ltd., "Incandescent gas-mantles." Sept. 18.

18,825.—Johnson, G. W., "Retorts for destructive distillation." A communication from H. Spurrier. Sept. 18.

18,827.—Sinnberg, T. E., "Gas-burners." Sept. 18.

18,874.—Weber-Marti, C. A., "Opening and closing low-pressure conduits for gas or other fluids from a distant point of actuation." Sept. 19.

18,890.—Haddan, R., "Lamp-lighting devices." A communication from J. W. Oliver. Sept. 19.

18,971.—Lucas, P., "Gas-lamps." Sept. 20.

18,974.—Kyle, W. T., and Lilley, J. E., "Gas cooking-stoves." Sept. 20.

19,005.—Illingworth, H., and Jackson, J., "Torch lamps for gas-lighting purposes." Sept. 21.

19,036.—Björnrud, E., "Acetylene gas generating and storing apparatus." Sept. 21.

19,048.—Boult, A. J., "Fluid meters." A communication from R. M. Bucks. Sept. 21.

19,052.—Berry, S. H., and Seagrave, G., "Generating acetylene gas." Sept. 21.

19,098.—Wright, J. W. B., and Darwin, H., "Burners for gas stoves or grates." Sept. 22.

19,155.—Dougill, J., "Internal combustion engines." Sept. 23.

19,164.—Robinson, H., "Gas-engines." Sept. 23.

19,193.—Duncan, J. H. H., The New Sunlight Incandescent Company, Ltd., and Barnett, H. T., "Lighting gas." Sept. 23.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Profit-Sharing Scheme of the South Metropolitan Gas Company.

Sir,—Judging by the Press comments on a small question of internal arrangement connected with our profit-sharing and shareholding scheme, it is clear that not a few persons would like to write "Failure" over the system—a view that I am glad to see you have done your best now, as always, to combat. Seeing that so much interest (friendly and otherwise) is taken in the subject, it may be well to repeat that the system was introduced for two objects of equal importance—viz., to attach the employees to the Company, and thereby to induce them to take an interest in its welfare, and at the same time to give them the opportunity to improve their position in life; in fact, to enable them to lift themselves from a condition of poverty to one of independence.

Both objects have been attained to a degree greatly exceeding my expectations; and it has been only the desire to spread more widely the last named that caused the issue of the circular which has created the commotion outside. For the first five years, all the annual bonus was payable in cash, but nearly half was left on deposit with the Company, and the remainder withdrawn. It, however, soon became evident that the men who exercised their right of withdrawal, speaking generally, derived no permanent benefit from the system. Consequently one of its chief objects failed in their case, though the other—and interest in the Company's welfare—was largely attained. To secure equal success with both the prime objects, the Directors in 1894 offered to increase the rate of bonus from 1 to 1½ per cent. on salaries and wages for every penny reduction in the price of gas below the standard of 2s. 8d. per 1000 cubic feet, on condition that one-half of the annual bonus should be invested in the Company's ordinary stock. Up to 1894, the amount invested voluntarily was of the market value of about £4000. It is now nearly £100,000, besides £30,000 or more on deposit at interest, and certain other investments in houses, a building society, &c. Many of the men who are now the possessors of substantial amounts say that prior to the introduction of the system they were never able to save a penny. I enclose an interesting letter from one of them (I know not who) that appears in to-day's "Daily Chronicle" on this point.

The immediate effect of the alteration was, of course, the saving of half the bonus in all cases by its investment in stock; and of the remaining half about 45 per cent. was left on deposit. Consequently the proportion of the total bonus saved rose at once from less than 50 per cent. under the original arrangement, to over 70 per cent. under the recent modification. Since then it has been gradually improving; and this year, out of a total bonus of £21,000, less than £5000 was withdrawn—about 77 per cent. being saved. It was, however, felt that a considerable proportion of the men who withdrew the £5000—men who had never made any attempt at thrift, and who every year had withdrawn all their bonus as soon as it was payable every July—were deriving no real and lasting benefit, and that a little pressure might induce them to begin to follow the example of their fellows. For this purpose, the circular in question was issued. Some do not like it; but already many have responded in the right spirit; and have begun to put by week by week the necessary amount to qualify them to receive next year's bonus in full. The very fact of the issue of this circular proves the success of the system. Had it not been very strongly established, we could not have taken such a step; but assured as we are of the hearty concurrence of all those who have really and permanently benefited by the profit-sharing—at least 60 per cent. of all the employees—the Directors felt the time had come, after ten years' patient working, when they could advantageously and safely take the step in question for the direct benefit of the officers and workmen, and the consequent indirect benefit of the Company.

I would suggest to those who think the thing is a failure to compare the cost of carbonizing per ton of coal of the three London Companies. The introduction of water gas is a difficulty in the work of comparison; but taking coal gas only, there is a difference of something like 1s. per ton, of which a good proportion is certainly due to the goodwill and the readiness to do a fair day's work on the part of our men. My only regret is that other Companies have not, by the adoption of the same system, derived similar benefits, which are many and great.

In reference to this circular, the statement has been made that "the profit-sharing scheme is not realizing Mr. Livesey's dreams." The writer is correct in assuming that I had dreams; but they were very moderate compared with the realization. I never dreamed that the system would create such mutual confidence and goodwill as have existed since its introduction, or that the Company and their workmen would be absolutely free to make their own arrangements without any outside interference whatever. I never dreamed that so large a porportion as at least half the workmen would take advantage of the opportunities to improve their position in life (my modest dream was that perhaps one-tenth would do so), or that in 1899 so large a sum as £21,000 would be distributed, and that so much as 77 per cent. of this sum would be saved. To have dreamed that in ten years nearly every officer and workman in regular employment would be a holder of the Company's ordinary stock; that the total investment of some 2800 men would be worth nearly £100,000, besides other large investments; and above all, that two workmen elected by their fellows would now by Act of Parliament be sitting on the Board, and have won the respect and confidence of their co-Directors, would, had it occurred to me, have been dismissed as the idlest of idle dreams.

George Livesey.

South Metropolitan Gas Company,
709A, Old Kent Road, S.E., Sept. 29, 1899.

The "Daily Chronicle" for the 29th ult. contained the following letter from one of the employees of the South Metropolitan Gas Company (referred to by Mr. Livesey above), giving his experience of the profit-sharing scheme:—

I have been employed by the South Metropolitan Gas Company since September, 1879, therefore have seen some of the results, and felt personally the real benefit, of the scheme. Ten years ago, when it was started, I had a wife and family. Consequently, it was difficult for me to

save. As a matter of fact, I hadn't a penny, and doubtless that would have been my position to-day if Mr. Livesey had taken no more notice of the welfare of his employees than some other employers. Now my position is as follows: Year by year I have had a bonus placed to my credit, which was transferred to stock; a few months ago I sold some, value £40, and obtaining an advance from our building society, bought a house, and have in the Company's funds at the present time £65. So you see this scheme gives me capital. By using it carefully, I am able to greatly better my position still further—viz., my bonus at present is £20, and my saving through building society about £20. These are not great figures, but to me a few years ago would have been "beyond the dreams of avarice."

The Hastings Carburation Process.

SIR,—The commercial value of the above process, away from its scientific bearing, I have no desire to discuss. The allusion I made to the Dessau experiments was not with the view of comparing the commercial merits of the two processes, but to show how misleading was the comparison made by Mr. Botley between the quantity of oil required to prevent naphthalene deposits, where in the one case the gas was pure coal gas and in the other a gas largely composed of carburetted water gas, which, when perfectly manufactured, requires no treatment to prevent naphthalene being deposited as a solid, but which helped to prevent naphthalene being deposited from the coal gas with which it was combined. The fact that Mr. Botley has succeeded in inducing some others in a like position to himself to make a trial of his process, proves nothing. It does, however, show the great need there is for a better and larger knowledge of the physical and chemical laws and principles involved in the solution of the naphthalene problem. Had such a knowledge more widely obtained, his commercial success might not have been so great. I had no desire to evade the point raised in the concluding paragraph of Mr. Botley's previous letter. The point was, however, in many respects so apparently weak, that I thought it better to take no further notice of it than I did. But as Mr. Botley again brings up the matter, both directly and also indirectly by referring to the adoption of his process by others similarly situated to himself, you might kindly allow me space to present the matter as it appears to me.

I take it that Mr. Botley's object in referring to the catch purifiers through which the mixed coal and carburetted water gas passes being partially choked with naphthalene, and to the outlet to the holder into which the *carburetted water gas* is constantly going being nearly made-up with naphthalene, was to show that the carburetted water gas was so loaded with naphthalene that it not only could not assist in preventing the naphthalene being deposited out of the coal gas, but it required to be sprayed with oil just as much as the coal gas; and that consequently the water gas did not contribute (as I said) to the prevention of the deposit of naphthalene, and the good results obtained were therefore solely due to the Hastings carburation process. So far as I can find, this is the first statement made by Mr. Botley as to the presence of naphthalene in the carburetted water gas. His most recent utterances on the subject are those given in his paper read in May last before the Institution of Gas Engineers, on the practical working of carburetted water gas at Hastings. From beginning to end of that paper, not a word is said about the carburetted water gas containing naphthalene; but there are numerous references to the gas having finely-divided oil diffused through it. For instance: "Some oil used to be deposited in this mixing-main before the improved carburetter was adopted; but now the condensation is only slightly *oily*." "With the purifiers, troubles at once arose owing to *oil* being deposited on the bott m layers of the material therein." "Oxide appears to have (and especially so when new) a marked detrimental effect on carburetted water gas, and becomes sticky with *oil*, which, however, disappears to some extent during revivification in the atmosphere." "The disposal of the spent lime has to be considered, for it will always be slightly affected with *oil*." "The gas is, after all, to a large extent a mechanical mixture, and part of the oil may be considered to be mechanically suspended by the non-illuminating constituents."

If at the date of his paper naphthalene had been present in the carburretted water gas, it is strange that Mr. Botley should have made no reference whatever to it. In the concluding paragraph of his paper, Mr. Botley says: "Surprise has been expressed that better results are not obtained from the oil with the improved carburetter than those given. It will have been noted that the oil is not wasted in the form of lamp-black or tar . . . there is under 10 per cent. of tar and tar oil. Nor is any serious amount of oil deposited in the purifiers. Hence the natural question is, If greater illuminating value is in the oil, what becomes of it?" Now I have no doubt, had Mr. Botley, instead of referring to the oil becoming deposited in the purifiers, told those present at the meeting, what he now tells us—that, instead of oil being deposited, the purifying material was partially choked with deposited naphthalene, and the gasholder inlet nearly made-up with naphthalene—his hearers would have had no difficulty in answering the above question.

In the discussion which followed the reading of Mr. Botley's paper, Mr. A. E. Broadberry, of Tottenham, remarked: "With regard to naphthalene, he had experienced that when they had got the chequer-work too hot, they produced naphthalene from carburetted water gas. In one well, where there was a self-acting syphon, they found a good many flakes of naphthalene round it." Now, if those flakes of naphthalene evidenced to Mr. Broadberry that their chequer-work was too hot, and that the oil used was being over-decomposed, then surely the enormous quantities of naphthalene in the purifiers and inlet to the gasholder at Hastings should satisfy Mr. Botley that, owing to the chequer-work of his carburetted water-gas plant being too hot, or to some other cause connected with his plant, the oils used were being greatly over-decomposed, and that in consequence the full illuminating value of the oil was not being obtained. This would explain why better results were not obtained from the oil with the improved carburetter, and why, as stated in my former letter, these matters should have Mr. Botley's immediate attention.

If carburetted water gas does not, as stated by Mr. Botley, always possess all the virtues attributed to it, it is not in consequence of any inherent defect in the carburetted water-gas process, but because the carburetted water-gas plant is not so operated as to obtain the combined virtues attributed to it; and if others like Mr. Botley choose to operate the process under such conditions as to over-decompose the oils, and thereby sacrifice, not only a part of the illuminating value of the carburetting oils, but also the virtue which the gas would otherwise possess of preventing the deposition of naphthalene from the coal gas with which it was mixed, and choose to adopt the Hastings carburation process to overcome those defects of their own mismanagement, then, as I have already pointed out, it is no evidence of the defects of the carburetted water-gas process, nor yet of the merits of the carburation process, but of lack of knowledge of the natural laws involved in the solution of the naphthalene problem, and of knowledge of how the carburetted water-gas plant should be operated to obtain all the results which I have attributed to it.

Mr. Botley blames me with accusing him of making incorrect statements in reference to the deposited oils from the carburation process found in the drip-wells, which he feels sure I would not have done had I visited his works. What I did was to show that Mr. Botley's artificial tension theory was erroneous; that his process was an oil-scrubbing one; and that the deposited oils from the works mains would show it to be so, as they would contain the naphthalene and other hydrocarbons they had dissolved out of the gas. In order to show that I was wrong, Mr. Botley on more than one occasion in his letters stated that the deposited oils from the process did not contain naphthalene. Mr. Leather visited his works, obtained samples of the deposited oils, analyzed them, and found they contained large quantities of naphthalene and other hydrocarbons dissolved out of the gas. Could I have done more to substantiate my position by visiting the Hastings works and seeing the process?

Priorsford, Peebles, Sept. 29, 1899. WM. YOUNG.

The Consumption of Water per Head in Different Towns.

SIR,—I am surprised that the question of the consumption of water per head has not ere this been before the British Association of Water-Works Engineers. The article by "Distributing Engineer," in the "JOURNAL" for Aug. 8 (p. 368) cannot fail to have opened the eyes of those who are responsible for the management of our water-works to the amount of unnecessary waste that goes on, and to the many ways that exist of draining the supplies provided at great expense for the consumers. Economy in distribution will, I venture to think, never be scientifically understood until engineers give their minds to the question, as doctors have done to sanitary matters during the past twenty years. Meters may show the quantity and direction of the consumption; but they will never indicate the fractures or the worn-out or other bad fittings causing the waste. It will be found as necessary to have trained waste inspectors, as gas companies find it to have meter inspectors; and then the excessive consumption may become practically a thing of the past. I know a case of an important town which suffered severely from water famine, though it was provided with waste meters; but the employment of a practical inspector reduced the consumption by 500,000 gallons a day within eight months. The fact that during the present year sixty Bills were before Parliament for the supply of water shows that the sources of supply are fast becoming appropriated, and consequently more scarce and costly; and therefore it is the duty of engineers and others responsible for the good management of water-works to study economy in distribution. A water-works inspector should be a man capable of examining all fittings, sounding pipes for underground bursts, and testing his metal mains in the evenings or early mornings. I have found in one district as many as 70 underground bursts on lead pipes, and in one month a burst on a 3-inch metal pipe, which gave no surface indication; and, besides these, imperfect fittings, which were condemned for new ones. Clauses are inserted in all Water Bills with the view of dealing with waste. Therefore, having these, it is the duty of all water companies and committees to make use of them. I would not place any restriction on the output; but vigilance certainly should be exercised in preventing waste.

Sept. 26, 1899. A WASTE INSPECTOR.

The Farnham District Council and the Gas-Works.—At a special meeting of the Farnham District Council held last Tuesday, it was resolved to take steps to acquire the undertaking of the Farnham Gas Company; and the matter will be considered by the ratepayers in public meeting on the 16th inst.

Bagshot Gas-Works.—Owing to the recent death of Mr. R. Kemp, the owner of the Bagshot Gas-Works, it is probable that the undertaking will come into the market. During the latter portion of Mr. Kemp's life, he developed the business considerably, with the result that it has now become almost too much for private enterprise. But whether the works will fall into the hands of colliery owners or the Blackwater and York Town Gas Company is an open question. According to a local paper, it is not thought practicable to form a Bagshot Gas Company at present.

Torquay Gas Company.—Mr. W. H. Kitson presided at the half-yearly meeting of this Company yesterday week, and congratulated the shareholders on the satisfactory position of the undertaking. The total revenue from all sources was £14,161; and the balance, after deducting the expenditure, was £3911. Dividends would absorb £3396; leaving a surplus of £515, as against £98 last year. The sales of gas to private consumers were £230 more than in the corresponding half of last year; but for public lighting they were £150 less. This was due to the introduction of electric lighting, in connection with which the Town Council were seeking for powers to borrow £10,000 more. There was a great improvement in the revenue from the sale of residual products; coke yielding £420, and sulphate of ammonia £130 in excess of the previous return. There was also a good improvement in the revenue from the hire of gas-stoves, and a considerable increase in the use of prepayment meters. They had not made much progress in the supply of gas-engines, although they had reduced the price of them; but, of course, there were no manufactories in Torquay. It was decided to pay the interim dividend at the usual rates of 10 and 7 per cent. Mr. Iredale, in moving a vote of thanks to the Chairman, said the public lighting of the town by electricity cost the ratepayers a great deal more than it did by gas. The Chairman said he was not in a position to say anything on the matter. The accounts of the town were published in a very voluminous form, and he doubted if anyone but the officials could get at the bottom of them.

MISCELLANEOUS NEWS.

THE HEALTH CONGRESS AT BLACKPOOL.

Responsibilities of Local Authorities—Local Indebtedness—The Smoke Nuisance—Dr. Thresh on the Value of Storage-Water.

At the Congress of the Royal Institute of Public Health, recently held at Blackpool, the above subjects were dealt with in the Municipal and Chemical Sections.

In the Municipal Section, the President (Mr. T. Loftos, the Town Clerk of Blackpool) devoted his address to the subject of the "Responsibilities of Local Authorities." He commenced by asserting that purity of administration in municipal and other local government affairs is greater to-day than it has ever been; and that a high sense of probity prevails among our public men. The duty of promoting the public health was, he said, necessarily the first and most important work of sanitary authorities. How it had developed during the Victorian reign was a matter of common knowledge. What, he asked, would be our condition if, with the enormous increase of population in the United Kingdom during the last hundred years, we were placed in the position of the country in the earlier half of the century, when hygiene did not exist, and the State took no interest in the public health. Since that time there had been a very great awakening to their responsibility both by Parliament and local authorities. The executive of administrative sanitary work in England and Wales alone was undertaken now by no less than 63 County Councils, 1115 Urban District Councils (including Borough Councils), 674 Rural District Councils, and 7364 Parish Councils, each entrusted with work of a sanitary nature, each specially acquainted with the needs of its own locality, each under an obligation to serve its constituents, and each responsible for fidelity to its trust. In addition, as *quasi*-sanitary authorities, there were in England and Wales alone 15 Joint Water Boards and Committees, 27 Joint Sewerage Boards, 104 Joint Hospital Committees, 222 Joint Cemetery Committees (including 218 Joint Committees acting under the Burials Acts), 3 Joint Recreation Ground Committees, and 3 Joint Rivers Committees. Exclusive of Joint Boards and Committees, there were in Scotland 33 County Councils, 260 Urban Authorities (including Town Councils of burghs), 99 Rural Authorities called District Committees of County Councils, and 977 Parish Councils; and in Ireland 33 County Councils, 74 Urban District Councils (including Borough Councils), 213 Rural District Councils, 159 Boards of Guardians of Unions, and 46 Boards of Commissioners of Towns which, though under municipal government, were not urban districts. So many statutes had been passed since the Consolidation and Amending Act of 1875, so many judicial decisions pronounced affecting local government and sanitary laws, that no apology was needed for advocating an early attempt being made to obtain a new Consolidating Act. An important phase of public work which increased the responsibilities of local authorities, their members and officers, was the carrying on of various business or trading undertakings, all of which, except tramways and telephones, came within local sanitary functions. On this subject he held the view that any undertaking (except, perhaps, telephones) which directly or indirectly interfered with the public roads, promoted the public health, provided a water supply, lighted the towns, or facilitated locomotion within the ambit of the local government district, was very fairly a right subject for possession by the municipality. But it should be a work of a general public character, a work which a local authority had better facilities for carrying out than private individuals, and which could be undertaken with pecuniary profit and material convenience to the community. The obtaining of parliamentary powers to secure these trading privileges, as well as other special powers connected with the good government of towns, formed the subject of frequent application to Parliament for Private Acts; and it was a question whether or not a very serious responsibility was not incurred in such applications, necessitating, as they unfortunately did, a large expenditure of public money. These applications by local governing bodies were in some measure held in check by an Act of Parliament ostensibly passed as an enabling statute to sanction the application of funds of governing bodies, *inter alia*, in promoting local Bills, but which, under the present title of the Borough Funds Act, 1872, unfortunately introduced a costly, a vexatious, and an inapplicable piece of machinery for the so-called protection of the ratepayers. It had been said that much expense might be avoided and justice brought to our own doors through the agency of the County Councils, and a transfer to them of many of the powers devolving upon several of the Government Departments; but he took the views of the responsible advisers of the majority of sanitary authorities to be that any such transfer of powers as proposed in 1889, and again in 1898, by certain Transfer of Powers Bills would not meet the case, and on the part of the non-county boroughs and Urban District Councils was likely to continue to meet with strenuous opposition. As regarded Scotland, an attempt had been made by the Private Legislation Procedure (Scotland) Act, 1899, apparently to reduce the cost of parliamentary applications. The proposal was an experiment; and the other portions of the United Kingdom, particularly the local authorities at a considerable distance from London, would watch its trial with interest. The address closed with some remarks upon the responsibilities of local public bodies in regard to the housing of the labouring classes, overcrowding, and the condition of the poor.

In the same section, a paper was read by Mr. J. Beckett, Borough Accountant of Accrington, on "Local Indebtedness." He said it was a remarkable fact that nearly all criticism of local indebtedness was vague and general, and never aimed at any particular class of expenditure. The following figures would furnish an apt illustration of this fact: In 1875, the local debt per head was £3 17s. 2d.; in 1884, £6 2s. 6d., or 59 per cent. over 1875; in 1894, £7 9s. 2d., or 93 per cent. over 1875, and 22 per cent. over 1884. To be effective, these figures should only represent indebtedness on unproductive works; otherwise the assets should be deducted before striking the average per head. This was contrasted with the growth of rateable value as follows: In 1875, the rateable value was £4 19s. 1d. per head; in 1884, £5 8s. 1d. per head; in 1895, £5 7s. 2d., or less than in 1884. He thought that until it was shown that sound local finance meant that local indebtedness ought to bear some ratio to either population or rateable value, or to both, or that population and rateable value must necessarily go hand in hand, such comparisons as these were not only meaningless but mischievous. The Local Government Board adopted another method of contrast, which, in his opinion, was equally meaningless. They set up a comparison between the National Debt of the United Kingdom and the local indebtedness of England and Wales; and for some years it had been their custom to place the figures side by side, to the manifest disadvantage of the latter. One asked in vain what connection there was between the National Debt and local loans—between the progress of sanitary science and municipal trading and the cost of wars. On the contrary, would it not be strange if the penalties of advancing civilization were less than those of an occasional step backwards into chaos, barbarism, and warfare? It was scarcely necessary to suggest that if circumstances arose by which (say) £300,000,000 should be added to the war debt, the Board themselves would discountenance any such comparison. Until the year 1879-80, the local debt of England and Wales did not exceed the rateable value. In 1895-6, or sixteen years afterwards, the debt exceeded the rateable value by £80,370,000—a result which was the direct outcome of municipal trading rather than unremunerative outlay on sanitary works. In 1879-80 the debts of local authorities stood at £136,934,000, and for the first time exceeded one year's rateable value. In this connection it was significant that borrowing powers for more than one-fourth of this sum had been obtained by Local Acts during the preceding ten years, mainly for commercial or *quasi*-commercial purposes; indeed, just in proportion as local authorities recognized the necessity for an enlarged sphere of activity, so private legislation by them became popular, and the lifeless past was left to bury its dead. The inevitable consequence was that the Local Government Board lost control of the expenditure of local authorities. Before 1882, the Board systematically called attention to this fact. In their report for that year, it was pointed out that since they were constituted (in August, 1871) the amount sanctioned by them to be raised by urban and rural sanitary authorities was £24,283,257 within a period of eleven years; while during the ten years ended 1881 the amount of borrowing powers exercisable without the sanction of the Board, conferred by Parliament, was £33,381,517, exclusive of the purchase-money for 25 gas and water undertakings and other purposes which could not be ascertained. In 1879, Birmingham obtained 90 years for the repayment of their water-works debt; Blackburn, Cardiff, Manchester, and Pemberton, 80 years for (*inter alia*) similar purposes. In 1881, Bradford obtained 108 years for water-works and 100 years for gas-works; and Reading, Birkenhead, and Cheltenham, 70 years for water-works. With these instances of 1879 before them, the Board, in their 1879-80 report, laid down the rule which guided them in fixing the time-limit for loans. After pointing out that it was obviously "a matter of much importance that the loans should in each case be paid off before the works on which they have been expended have become worn out or obsolete," they proceeded: "Our rule is to limit the period allowed for the repayment of each loan to the number of years during which the works can reasonably be expected to remain serviceable." In the session of 1882, a new Standing Order (173A) was introduced at the suggestion of a past President of the Board, which directed the Committee on a Bill to consider whether, among other things, "the Bill assigns a period for repayment of any loan exceeding the term of 60 years, which term the Committee shall not in any case allow to be exceeded, or any period disproportionate to the duration of the works to be executed." Clearly, an arbitrary rule, not to be violated "in any case," framed without any regard whatever to the character of the assets acquired, might just as well set up one limit as another. Therefore, when the Local Government Bill of 1888 was before Parliament, a majority of 117 declined to assign 60 years for the repayment of the loans of County Councils, although the Bill started out with that limit, and substituted 30 years. On the other hand, the Poor Law Act, 1897, extended the limit for the redemption of loans to Poor Law authorities, which up to that time was 30 years, to 60 years. This was a step in the right direction; and he submitted that there was no good reason to differentiate between these and sanitary authorities. Local debts had risen from £92,820,000 in 1875 to £243,209,000 in 1896, without adding anything for the amount redeemed in the *interregnum*, or an increase of 162 per cent. in 21 years. But that was not one-and-a-half times the rateable value; so that, upon the hypothesis of the Public Health Act, 1875, the local authorities of England and Wales, taken together, had not transgressed the bounds of prudence, although the greater part of the debt had not been raised under Sanitary Acts. Water-works, gas-works, and electricity absorbed one-fourth the total debt in 1896; having gone up from £41,834,000 in 1884 to £64,248,000. The continuous transference of such undertakings explained this increase. Out of 57 gas-works, the details of which were set out in "Burdett," only one was originally established by the corporation; and out of 88 water-works, 55 had been acquired from private companies. Mr. Beckett went on to say that the old method of measuring the soundness of local finance must be abandoned, and that a municipal authority must submit to the traders' test, and their gross debt be viewed in the light of the assets and their earning power. The excellent credit of local authorities was obtained at no cost beyond able and efficient, and withal honest, administration—a very conspicuous feature of the local government of this country. Notwithstanding this fact, were it not for the continued cheapening of money, attention would perforce have long ago been directed to the constantly reduced time-limit for the repayment of loans to which he had alluded. Having indicated the dangers of long-lived stock, and advocated the issue of short-lived stock, Mr. Beckett proceeded: Formerly the utmost dissimilarity prevailed in the time for loan repayment for the same class of debt; but we have now been reduced to a vexatiously low level, and are verging on the intolerable strain. The rate of depreciation—for a sinking fund is only another name for it—applied to municipal property is monstrously out of all proportion to its durability in very many cases; and no private owner, however prudent, even in prosperous times, is so taxed for this purpose. Technical instruction schools are severely taxed in their resources for no other reason than that they are required to pay for premises, with 70 years' usefulness in them, within 30 years; and the 1d. rate intended to subsidize education proves inadequate to pay the rent of the necessary premises. The case of water-works is much worse. The towns in the Fylde district have just acquired their water supply for £800,000; and, as is common in such cases, besides paying interest equivalent to the maximum dividend of the former proprietors, they are compelled to pay

off this large sum in 50 years, although the private undertakers who preceded them were under no such obligation. Thus the Local Authorities of these places are compelled to carry a burden of £7000 a year more than their predecessors in the same business. Other corporations provide no more than one-fifth of that sum for a debt of the same magnitude and for a similar purpose. I submit that the time has arrived for a powerful organization, such as this Institute, to raise its voice in protest against the financial tyranny thrust upon local authorities, and to urge that some regard shall be paid, in fixing time limits, to the duration and serviceableness of public undertakings, and that reason, and not the *ipse dixit* of an arbitrary authority, shall dominate the financial policy of the vast municipal interests of the country. (A resolution in these terms was passed.)

In the section devoted to Chemistry and Meteorology, the President of which was Mr. A. E. Fletcher, formerly the Chief Inspector under the Alkali Acts, Dr. Graham, Medical Officer of Health for Middleton, read a paper devoted to a consideration of the smoke nuisance and the efforts which have been made to abate it. He said this nuisance had followed in the train of Watt's improvement of the steam-engine, at the dawn of the century. It was felt in Manchester in 1801; the records of the Court Leet showing heavy fines on owners of factories. Atmospheric impurities were preventible. The evil defects were deterioration of health, destruction of natural and architectural beauty, separation of classes, and increased financial expenditure. The loss of sunlight was a most potent factor. Attention in our large towns to the dangers had been drawn by the medical profession; and it had been established as clearly as any law of physics that a manufacturing district might be freed from black smoke. But action was not in accord with knowledge. For many years the community had been informed as to the proper principles on which mechanism for complete combustion could be constructed. The report of the Committee formed in Manchester in 1889 showed, as a result of observations of 179 chimneys, a general average of 102 minutes in 10 hours—varying from 423 in the worst to 4 in the best. Since the publication of that valuable report, a few new appliances had been brought before the public, as well as smokeless fuel; but there were sufficient already to enable manufacturers to comply with the law. In regard to the practice of sanitary authorities in dealing with the smoke nuisance, there was a great want of uniformity. Voluntary efforts to suppress the nuisance led to the formation of a society in Manchester in 1842, presided over by Lord F. Egerton. Glasgow, Sheffield, Leeds, Manchester, Middleton, and recently London, had formed Committees to cope with it. One of the principal sources of smoke was from house chimneys. It was, however, less dense, the coal used was better, and the smoke more diffusible and less under control. The evil might be greatly reduced by stoves; and where gas could be cheapened it should be used as a fuel, on grounds both of economy and cleanliness—being without smoke. In Birmingham, the late Dr. Lawson Tait claimed a saving of £200 per annum in his establishment by its use. The subject of smoke prevention was an important though difficult one for Medical Officers of Health and Sanitary Inspectors. The methods might be sufficient, but the law was lax; and a better administration of the Public Health Acts should be provided for. To bring this about, a determined pressure on the part of the community was required; and he hoped they would not see the present century end without reasonable protection from so great an evil.

Dr. J. C. Thresh, Medical Officer of Health for the County of Essex, dealt with the efforts which have been made during recent years to prevent pollution. He pointed out that more attention had been given to the protection of river, spring, and well water from pollution than to preventing the contamination of surface water supplies. This was doubtless due to the fact that all the recent large outbreaks of typhoid fever had been due to the use of river or spring water, and the smaller outbreaks to polluted shallow wells. Surface water collected on a large scale for the supply of a town or series of towns and villages had rarely been charged with the spread of that disease. This was a subject of congratulation to those towns so numerous in the North of England, deriving their water from such sources. He attributed this immunity entirely to one cause—the storage of water in large reservoirs. The storage usually amounted to from 100 to 200 days' supply; and while thus at rest the water was fully exposed to the air for oxidation and to the sunlight for insolation, and more or less thorough sedimentation was secured. He felt tolerably certain that the typhoid organism, if introduced into such a reservoir, had but a remote chance of surviving and reaching the water-mains in a living condition. In the first place, the environment of the bacteria was unfavourable; the sunlight quickly killed them as they approached the surface, and by sedimentation they were deposited with the mud at the bottom of the reservoir. To prevent the possibility of pollution of such a supply, local authorities should obtain full control of the collecting areas, have ample storage in efficiently protected reservoirs, and adopt careful sand filtration, or, in certain cases, filtration through sand and limestone.

BRITISH GASLIGHT COMPANY, LIMITED.

The Half-Yearly General Meeting of this Company was held last Wednesday, at the London Offices, No. 11, George Yard, Lombard Street, E.C.—Mr. J. Horsley Palmer in the chair.

The Secretary (Mr. H. B. Chamberlain) read the notice convening the meeting, and also the report of the Directors for the six months ending June 30 last. It stated that the balance of profit was £21,369, after deducting the following items (omitting shillings and pence): Income-tax £786, Hull excess profit £555, Potteries excess profit £309, Trowbridge excess profit £48, Hull debenture interest £845, Norwich debenture interest £918, Potteries debenture interest £386—making a total of £3851. Referring to the working of the Hull station, the Directors remarked that the gas-rental showed an increase of £2540, as compared with that of the corresponding period of 1898; the price of gas having been the same at each period—viz., 1s. 10d. per 1000 cubic feet. On coke there was an increase of £1206, on tar and tar distilling of £450, and on ammoniacal liquor and sulphate of ammonia of £481. Coal cost 10s. 11d. per ton, against 10s. 6d.; and coke produced 8s. 9d. per ton, as compared with 8s. 1d. The gas sent out was 453,594,611 cubic feet, as against 423,303,604 feet, or an increase of 30,291,007 feet, which was equal to 7·15 per cent. The profit realized was £555 in excess of the parliamentary interest allowed. This sum had been invested in Consols; making the reserve fund at this station £34,771. Regarding the Norwich station, the report mentioned that the gas-rental exhibited an increase of £1315, as compared with that of the corresponding period of 1898; the price of gas having been the same at both periods—viz., 3s. per 1000 cubic feet. The sum realized for coke, tar, and ammoniacal liquor increased by £222. Coal cost 15s. 3d. per ton against 14s. 3d.; while coke realized 9s. 2d. per chaldron, as compared with 7s. 7d. The gas sent out was 154,727,000 cubic feet, as against 149,709,000 feet, or an increase of 5,018,000 feet; being equal to 3·35 per cent. The profit was £3230 less than the parliamentary interest. Respecting the Potteries works, it was stated that the gas-rental had increased by £1243; the price of gas having been the same as in the corresponding period of 1898—viz., 2s. 3d. per 1000 cubic feet. Coke and tar showed an increase of £896, and ammoniacal liquor and sulphate of ammonia £193. Coal cost 9s. 1d. per ton, against 8s. 4d.; and coke realized 5s. 6d. per ton, as compared with 4s. 6d. The quantity of gas sent out was 165,109,000 cubic feet, as against 159,420,000 feet, or an increase of 5,689,000 feet; being equal to 3·56 per cent. The profit realized was £309 in excess of the parliamentary interest allowed. This sum had been invested in Consols; making the reserve fund at this station £17,892. In regard to Trowbridge, the gas-rental exhibited an increase of £315; the price of gas having been the same as in 1898—viz., 3s. 2d. per 1000 cubic feet, with discounts. The residual products realized £203 more than at the corresponding period of 1898. Coal cost 13s. 9d. per ton, as against 13s. 8d.; while coke produced 6s. 8d. per chaldron, as compared with 5s. 10d. The gas sent out amounted to 24,982,271 cubic feet, as against 23,087,933 cubic feet—an increase of 1,894,321 cubic feet, or equal to 8·20 per cent. The profit realized was £48 more than the parliamentary interest. This sum had been invested in Consols; making the reserve fund at this station £3084. At the Holywell station the receipts for gas and residual products showed slight increases; and the profit was £369. The profit over the whole business, added to the previous balance of profit and loss, amounted to £46,085. From this the Directors recommended a dividend at the rate of 10 per cent. per annum, clear of income-tax. This, it was stated, would amount to £21,000, and leave a balance of £25,085.

The Chairman said it devolved upon him to make a few remarks regarding the business of the past half year. When last he had the pleasure of addressing the shareholders, he expressed the hope that the proceeds of the coming half year would be as good as those then under discussion; and he was very glad that, as might be seen by the accounts, the operations of the six months now under consideration had realized that hope, insomuch that, notwithstanding the increase in the price of coal and the remarkably mild months of January and February, and also the extremely light and warm month of June, they had made an increased profit—certainly a small, but still a satisfactory, sum—of £300. Therefore it was, he thought, a matter for congratulation to the shareholders that the Board had been able to put these accounts before them, and to maintain the dividend (which, in his opinion, was a very gratifying one) of 10 per cent. To his mind, if he might be allowed to say so, the shareholders ought to be thoroughly satisfied with a dividend of 10 per cent. Nowadays, all great public institutions of this country like railway and gas companies (and, in fact, all companies might be included in the public institutions of the country who had to supply the general public with their daily wants) had to look closely into matters connected with their consumers as well as matters connected with their dividends. What he meant was that gas companies in these days could not expect to squeeze every atom of dividend out of the consumers, but must meet and consider them, even if at times the dividends were not all they were entitled by Parliament to earn. So long as the shareholders were receiving a satisfactory dividend, they ought to consider the consumers very largely indeed. This was the policy the Board had always pursued. He made this remark because it might have been observed, in connection with the Norwich accounts, that they had not there earned the entire amount to which they were justly entitled if they had strictly adhered to their Act of Parliament. There were a few details respecting the business generally which might be of interest. When speaking at the meeting six months since, he said it was hoped that by September the Company would be in a position to furnish the Hull Corporation with gas in bulk for the supply of the Kingston-upon-Hull district. But, unfortunately, though the Company were in a position to supply the gas, the Corporation were not ready to receive it. He did not mean by this that the Corporation had been dilatory, but they had come across many obstructions in making the large subway underneath the docks in which the connecting mains had to be laid, so that they had not yet been able to complete this portion of the work. He expected the Company would be asked to deliver gas somewhere about March 31 next, when the financial year of the Corporation terminated. The Company had not a very large amount of money lying idle in consequence of this. They had certainly had to put down some large mains; but they were able to purchase them at a cheaper rate than they would have had to pay if they were buying them now. As he informed the shareholders six months ago, the Directors had in contemplation the building of an additional gasholder at Hull. Plans were got out in due course; and the work had been commenced. Messrs. Aird were constructing the tank, and it was progressing very favourably. The contract had also been got out for the holder; and the total cost of the work would be about £40,000. The business at Hull was increasing steadily and satisfactorily. They had between 5000 and 6000 slot meters placed there, and upwards of 3000 stoves and cookers. He might mention that the consumption of gas by the slot meters at Hull was remarkably good; the average being above 12,000 cubic feet. Those who were interested in, or had any knowledge of, these matters, would know this was a satisfactory return. The average consumption by the cookers was nearly 20,000 cubic feet; and, at these rates, business in these directions paid very well indeed. As to Norwich, it would be remembered that, at the time of the last meeting, they were in the throes of a struggle with the Assessment Committee; and the Directors had determined, if necessary, to appeal to Quarter Sessions. However, he was glad to say, after a lengthy interview between the Committee and Mr. Corbet Woodall and himself, they were able to get a considerable reduction, though not to the extent to which

they considered the Company entitled. But they got the assessment reduced by £1450 out of a total of £5250; and though he contended that this was not sufficient, still they thought it better not to go to the great expense, and incur the annoyance and irritation, which was caused by appeals to Quarter Sessions against the decisions of Assessment Committees. Consequently, the Board had accepted the reduction; and this would hold good for three years. This time last year, he also referred to the position of the business at Norwich, and said he hoped they had "turned the corner" with regard to the decrease. Notwithstanding the keen competition of the electric light, he was glad to be able to report that they had obtained a very considerable increase there. They had also fitted up a great many houses, and had received applications for new business in various directions where they were not supplying before. Altogether, he thought the prospect was decidedly brighter. At the Potteries, their business was going on exceedingly well, as shown by the report, which stated that the surplus profit there, after taking the full amount of the dividend to which they were entitled, was £309, which made the total reserve at that station nearly £18,000; and as £19,000 was the maximum reserve, they had nearly arrived at that position. And this with a price of 2s. 3d. per 1000 cubic feet, which was far lower than the charge of any Corporation works in the district. At this station, they had again a considerable increase in the number of slot meters. They had now nearly 3000 there, and in addition 1650 stoves. The average consumption of the slot meters was above 10,000 cubic feet; so that in every respect, the working at the Potteries station was exceedingly satisfactory. At Trowbridge, they had been proceeding with the reconstruction of the retort-house, which work had been commenced when last he addressed the shareholders. A new gasholder tank was also being built, and was progressing favourably. This station showed an increased consumption of 8¼ per cent.; so it was high time the plant there was reconstructed and additions made to enable them to meet the needs of the district. He did not think there was anything further to say with regard to the past half-year's operations; but respecting the future, they had to look forward to dearer coal. Products, however, were selling better, especially at Hull, where they had made a contract for the sale of pitch for the coming year, at a price which had only once been exceeded in the history of the Company. He looked forward with confidence to the future, although he did not think they could expect to get such large profits as they had made in some past years. He moved that the report and accounts be received and adopted.

Colonel J. Wilkinson seconded the motion, which was unanimously carried.

On the proposition of the Chairman, seconded by Major-General W. T. Corrie, a dividend was declared at the rate of 20s. per share for the half year, clear of income-tax.

The retiring Directors (Mr. J. Horsley Palmer and Mr. F. Wilkin) and the Auditor (Mr. E. Knowles Corrie) having been re-elected,

Mr. R. S. Gardiner moved that the best thanks of the shareholders be given to the Chairman and Directors.

Mr. B. F. Harris seconded the motion, which was unanimously carried.

The Chairman responded, and then moved a vote of thanks to the Secretary and officers of the Company, who, he remarked, worked very earnestly in promoting the welfare of the Company.

Mr. Frederic Lane Linging seconded the motion, which was unanimously agreed to.

Mr. Chamberlain having responded, the proceedings terminated.

SHREWSBURY GAS COMPANY.

The Annual General Meeting of this Company was held last Wednesday—Mr. J. Spencer Phillips in the chair.

The Secretary and Manager (Mr. W. Belton) having read the notice convening the meeting, the report and accounts were presented. They showed a profit of £5136 on the year's working, out of which an interim dividend was paid in March last; and the Directors recommended that the authorized dividend be declared, after providing for which and for interest on mortgages, there would be a balance of £183 14s. 7d. to carry forward. They stated that there had been a satisfactory increase of 5·31 per cent. in the consumption of gas during the year, and that the unaccounted-for gas had slightly decreased—to 8·09 per cent. They expressed their pleasure at reporting an improvement in the residuals market—the result being an increased return of £637. But, on the other hand, they have had to face increased cost of material and labour during most of the year, and there was also a rise of 1s. 6d. per ton in the price of coals. During the year, 549 prepayment meters had been fixed, and 156 cooking and heating stoves had been let on hire.

The Chairman, in moving the adoption of the report, said the Directors regarded it as an exceedingly satisfactory one, as it showed both soundness and steady growth in the Company's business; and they did not think it would be otherwise in the future. Proceeding to deal in detail with the various items in the accounts, he pointed out that the Company had raised £80,000 in stock, with the premiums, and had exercised their borrowing powers to the fullest extent. During the past year they had spent £2289 on capital account, nearly £2000 of which was for prepayment meters. This led to a most satisfactory increase in the business; and it was developing daily. The statement in the report that 549 of these meters had been fixed and 156 cooking and heating stoves let on hire only gave a small idea of the business the Company were doing. Since the end of June, they had had 97 more stoves and 171 slot meters ordered; and when these were supplied they would have out on hire 335 stoves and 961 prepayment meters. During the current year, more capital would have to be expended on the extension of mains. In the past twelve months, they had made 160 million cubic feet of gas, which was an increase of 6,263,000 cubic feet, or 4·07 per cent. over the preceding year. When he mentioned that twenty years ago the make was only 82 millions, the shareholders would see that it had increased nearly 100 per cent., although the population of the town had probably not augmented to the extent of 5 per cent. The sale of gas had advanced in greater ratio—viz., 7,296,000 cubic feet, or 5·31 per cent. To make this gas, they had carbonized 13,536 tons of coal and 1029 tons of cannel. Turning to the revenue account, they had sold £22,037 worth of gas—an increase of £1063 over the year 1897-8, notwithstanding the competition of the electric light. The total receipts were £1836 more, or 7·36 per cent. With regard to manufacturing charges, they paid £388 more for coal, which, considering the much greater make, was less than one might expect; but by careful management and economy on the part of their excellent Manager, although they had carbonized considerably more coal, they had used less cannel, and had therefore kept the cost down. Passing on to deal with the other items of expenditure, he explained that the law charges—£88—were £77 more than in 1897-8, owing to the fact that the Company deemed it to be their duty, as the largest ratepayers in the town except the Railway Company, to oppose the application of the Corporation to acquire the electric light undertaking. Their relations with the Corporation, however, were quite friendly. The total expenditure last year was £1844 more than in the preceding twelve months; and the difference in the profit was only £8 14s. 10d.—showing the extreme steadiness of the business. Everything was going on smoothly, both in the works and in regard to the Company's relations with their customers. They were indebted to Mr. Belton both for his able management inside the works and the aptitude with which he dealt with complaints, and with any of the contingencies to which all large manufacturers were subject.

The Deputy-Chairman (Mr. W. Beacall) seconded the motion; and it was carried unanimously.

A dividend of 7½ per cent. per annum was then declared; and the retiring Directors and Auditor having been re-elected, the proceedings closed with votes of thanks to the Chairman and Directors and to Mr. Belton.

COLONIAL GAS UNDERTAKINGS.

In the "Journal" for the 5th ult., we gave a report of the annual general meeting of the Australian Gaslight Company, showing the results of the working in the six months to June 30. The accounts of other Colonial gas undertakings have since come to hand, from which the following particulars are extracted:—

The statement of accounts for the six months ending June 30 which was submitted at the half-yearly meeting of the Brisbane Gas Company showed a sum of £9693 standing to the credit of the profit and loss account, including the balance brought forward. The Directors recommended a dividend of 5 per cent., amounting to £6995, the tax on which came to £349—together, £7344; leaving £2349 to be carried forward. The sale of gas produced £19,767; and the expenses of manufacture, with allowance for depreciation of plant, came to £10,551.

The profit of the Maryborough Gas Company for the first half of the year, added to the unappropriated balance, was £1057; and, after deduction of the dividend tax, there was left a sum of £1018 to the credit of the profit and loss account. This sum the Directors recommended should be used in payment of a dividend for the six months at the rate of 6 per cent. per annum, £771; carrying forward the balance of £247. The sale of gas produced £3096, and residuals £146.

The North Shore (Sydney) Gas Company, Limited, realized a net profit of £3006 on the sale of gas, &c., to the 30th of June. Adding the balance brought forward (£43) made a total of £3049. Out of this the Directors recommended the following appropriations: A dividend of 3 per cent. for the half year, free of income-tax, £2700; a further sum to provide interest on borrowed money to June 30, £221; payment to officers' fidelity guarantee fund, £50; interest suspense account, £20—making together £2991, and leaving a balance of £58 to be carried forward.

At the 53rd half-yearly meeting of the Rockhampton (Queensland) Gas Company, the Directors announced that the operations of both sections of the Company's business—gas and electric lighting—were extending, especially the former; the demand for gas naturally increasing with the development of the town. The operations in this department showed a profit of £1774; but, on the other hand, the electrical business resulted in a loss of £105. The Directors explained that in both departments exceptionally large sums, portions of which might legitimately have been charged to plant, and amounting in the aggregate to £618 13s. 11d., had been debited direct to maintenance. They recommended the payment of a dividend at the rate of 7 per cent. per annum upon the ordinary shares, and 9 per cent. per annum upon the preference shares; amounting to £1685 free of dividend duty. This would necessitate the transfer of £474 from the reserve for the equalization of dividends.

At the annual meeting of the South Australian Gas Company on the 30th ult., the Directors expressed their pleasure in reporting that, owing to a satisfactory increase in the sale of gas and improved returns for residuals, the profit made in the year ending June 30, after allowing for depreciation, was sufficient to pay the usual dividends, add £3000 to the replacement fund, and increase the balance carried forward to £15,189. Continuing the policy which has been followed since the formation of the Company, the Board have resolved that, from the September meter readings, the charges for gas supplied by meter from the City and Port Adelaide works shall be reduced to the following rates: For accounts of 50,000 cubic feet of gas per month supplied from the city works to one establishment, 5s. per 1000 feet; for other accounts, 5s. 6d. For accounts of 50,000 cubic feet of gas per month supplied from the Port Adelaide works to one establishment, 5s. 10d. per 1000 feet; for other accounts, 6s. 3d. Although the street-lamps at Port Adelaide have not been lit by gas since January last, there has been a considerable increase in the quantity of gas sold by meter from these works. A number of customers at the Port, including some who previously used electric light, have had incandescent gas-lamps fixed inside and outside their premises. A lamp contract for five years has been entered into with the Port Pirie Corporation. The consumption of gas having increased at these works, an additional gasholder is about to be erected there.

A Gift of a Village Water Supply.—The Pickering Rural District Council yesterday week had under consideration the accounts in connection with the new water scheme for Cropton, which, so far as the original estimate went, has been satisfactorily completed. The total cost of the work done is £1695. The entire expense of the scheme is being defrayed by a local resident, Mr. J. Gill; and he proposes to make further extensions at a cost of £190.

COMMERCIAL GAS COMPANY.

The Half-Yearly Report and Accounts.

The following is the report of the Directors of this Company for the half year ending June 30, which, with the accounts for this period, will be presented at the meeting of the proprietors on Thursday :—

The Directors submit the accounts for the half year ended June 30, 1899. The revenue account shows a net profit for the half year of £53,549 6s. 2d.; making, with £293 7s. 8d., received for interest, £53,842 13s. 10d. This, added to the amount brought forward from the previous half year, makes £55,719 3s. 6d. Deducting therefrom £5290 4s. 4d., for interest on debenture stock, there remains standing to the credit of the net revenue account a balance of £50,428 19s. 2d. available for dividend. The Directors recommend that dividends be declared at the rates of 13½ per cent. per annum upon the old stock of the Company, and of 10½ per cent. per annum upon the new stock, both less income-tax. The balance of the net revenue will be carried forward to the next half year.

The accounts accompanying the report consist of the usual statements. They show that stock to the amount of £785,250 has been raised out of the total of £830,000 authorized; and that £235,120 has been borrowed out of £300,000 sanctioned. The receipts on capital account amount to £1,020,370 (issues of £570 of new stock and £12 of debenture stock having been made in the past half year); and there is £24,229 of premium capital—making together £1,044,599. The balance of £1810 is carried to the balance-sheet. The expenditure on capital account in the past six months (£14,791) comprised £6804 for new and additional buildings, plant, &c.; £2138 for mains and services; £2199 for meters and stoves; and £3649 for "coin" meters and fittings, less £1641 written off for depreciation. The total expenditure to June 30 last amounted to £1,046,409. The reserve fund at the above-named date stood at £42,093, and the insurance fund at £28,652. The balance-sheet shows that the value of the stores in hand at the close of the half year was as follows: Coal and oil, £30,035; coke and breeze, £268; tar, ammoniacal liquor, and sulphate of ammonia, £6244; sundries, £16,984—making a total of £53,533. The revenue and profit and loss accounts, together with the statements relating to the manufacturing operations of the Company in the half year, are given below.

REVENUE ACCOUNT.

To Manufacture of gas—					By Sale of gas—				
Coals and Oil, including dues, carriage, unloading and trimming	£76,628	14	6		Common gas, per meter, at 2s. 6d. per 1000 cubic feet	£144,764	15	11	
Salaries of Engineer and Officers at works	2,416	0	0		Public lighting and under contracts, common gas	10,192	1	3	
Wages (carbonizing)	16,895	15	0						£154,956 17 2
Purification, including £3159 8s. 5d. for labour	6,631	1	11		Rental—				
Repair and maintenance of works and plant, materials and labour (less £89 4s. 11d. received for old materials)	15,807	12	3		Meters	£2,468	6	4	
				£118,379 3 8	Stoves	1,395	13	8	
Distribution of gas—					Automatic meters and fittings	2,686	16	7	
Salaries and wages of Officers (including Rental Clerks)	£1,876	7	8						6,550 16 7
Repair, maintenance, and renewal of mains and service-pipes, including labour	2,089	9	4		Residual products—				
Repair and renewal of meters	1,690	17	6		Coke, less £3815 15s. 8d. for labour	£20,963	0	8	
" " stoves	1,732	16	5		Breeze, less £693 6s. 9d. for do.	1,847	3	3	
" Automatic meters and fittings	1,641	7	2		Tar	7,595	12	11	
				9,030 18 1	Ammoniacal liquor and sulphate of ammonia	7,339	4	9	
Public lamps—lighting and repairing				3,034 5 8					37,245 1 7
Rents, rates, and taxes				7,336 1 9	Miscellaneous receipts—				
Management—					Rents receivable	£226	13	10	
Directors' allowance	£1,250	0	0		Transfer fees	33	10	0	
Company's Auditors	75	0	0						230 3 10
Salaries of Secretary, Accountant, and Clerks	1,133	14	0						
Collectors' salaries and commission	1,608	14	10						
Coin meter collection	339	16	3						
Stationery and printing	660	8	4						
General charges	560	12	7						
				5,628 6 0					
Bad debts				584 16 6					
Discount and allowances				939 11 6					
Law and Parliamentary charges				164 7 7					
Superannuation				93 0 0					
Official Officers				272 19 8					
				£145,463 13 0					
Balance carried to net revenue account				53,549 6 2					
				£199,012 19 2					£199,012 19 2

PROFIT AND LOSS (NET REVENUE) ACCOUNT.

Interest on debenture stock	£5,290	4	4	Balance from last account	£49,540	17	2
Balance available for dividend	50,428	19	2	Less dividend for half year ended Dec. 31, 1898	47,664	7	6
					£1,876	9	8
				Balance from revenue account	53,549	6	2
				Dividends and interest balance	293	7	8
	£55,719	3	6		£55,719	3	6

STATEMENT OF COALS.

Description of Coal.	In Store, Dec. 31, 1898.	Received during the Half Year.	Carbonized during the Half Year.	Used and Sold in Half Year.	In Store, June 30, 1899.
	Tons.	Tons.	Tons.	Tons.	Tons.
Common coal	22,774	89,247½	81,439½	411	30,171
Cannel	8,361	Nil.	50*	645	7,666
	31,135	89,247½	81,489½	1,056	37,837

* 1,589,925 gallons of oil used for enrichment and oil-gas manufacture.

STATEMENT OF GAS MADE, SOLD, &c.

Quantity Made. Meter Register (and estimated).	Quantity Sold. Public Lights and under Contracts (estimated).	Quantity Sold. Private Lights (per Meter).	Total Quantity accounted for.	Number of Public Lamps.
Thousands.	Thousands.	Thousands.	Thousands.	
1,330,191	64,191	1,158,871	1,243,345	5,702

STATEMENT OF RESIDUAL PRODUCTS.

	In Store, Dec. 31, 1898.	Made during Half Year.	Used in the Half Year.	Sold in the Half Year.	In Store, June 30, 1899.
Coke—tons	5,180	49,881½	15,838½	39,152½	70
Breeze—tons	1,085	10,631½	—	10,616½	1,100
Tar—gallons	391,000	1,140,781	—	1,037,281	494,500
Ammoniacal liquor—butts	8,115	26,122	31,793	—	2,439
Sulphate of Ammonia—tons	120	971½	—	891½	200

THE EXMOUTH GAS COMPANY AND THE DISTRICT COUNCIL.

In the course of the proceedings at the half-yearly meeting of the Exmouth Gas Company last Tuesday, Mr. H. A. Willey made an interesting reference to the relations between the Company and the District Council. He said the Council proposed to undertake the supply of electricity. It was the fashion for municipal authorities to erect electric lighting works, notwithstanding the enormous amount of unremunerative capital employed, and the high price at which electricity was produced to pay expenses. If the Council were desirous of undertaking the lighting of the town, they would have been well advised to approach the Gas Company, with a view to acquiring their property, which the Company would have been quite willing to sell at a fair commercial valuation. Then the Council would have had control of the gas supply, with the idea of its being utilized for private installations of electricity, and for furnishing the power for working the dynamos for public lighting, which could have been erected on land at the gas-works. An enormous saving of public money would thus be effected. It was a fact that electric current could be produced by this means at less than 1d. per unit. The experience at Torquay and elsewhere showed that electric lighting did not interfere to an appreciable extent with the use of gas. At Brighton, where electricity had been exploited more extensively than at any other place in England, an enormous increase in the sale of gas had taken place, owing especially to the extensive use of gas cooking-stoves and prepayment meters among the artisan classes. However, if the Local Authority at Exmouth were determined to have electrical works, there was no necessity to import into the matter the slightest feeling of discord with the Gas Company. The town owed a great debt of gratitude to the Company. Fifteen or sixteen years ago, when things were not so prosperous as they were now, the shareholders contented themselves with greatly reduced dividends; and in later years, when they might have paid themselves back those arrears, they refrained from doing so in order that the price of gas might be reduced. This was a public-spirited proceeding which deserved recognition. Another matter in which the Company had shown public spirit was in reference to the lighting of the town; for, notwithstanding the addition of a large number of lamps, the bill for public lighting was considerably less than formerly.

The return submitted with the accounts showed that the make of gas in the half year was 17,788,100 cubic feet, as against 16,169,800 cubic feet in the corresponding half of 1898. The total consumption increased from 13,188,000 to 14,280,914 cubic feet. The whole of this increase was in the gas supplied to private consumers either through ordinary or prepayment meters; there being a drop of 15,000 cubic feet in the quantity supplied for public lighting, notwithstanding an addition of 15 to the number of lamps. The Directors reported that, in consequence of the extended demand for gas for slot-meter supply and for cooking purposes, it was necessary to lay down additional mains and services. For this and other purposes they proposed to issue 200 5 per cent. preference shares of £10 each. The report and accounts were adopted.

LEEDS CORPORATION GAS UNDERTAKING.

Excellent Working and Financial Results.

The Leeds Corporation Gas Committee, meeting last Wednesday under the chairmanship of Alderman Lowden, had before them the report on the working of the undertaking for the year ending June 30. It discloses results of a very satisfactory character. The gas made during the year was 3,016,979,254 cubic feet; being an increase, compared with the preceding twelve months, of 167,745,779 cubic feet, or 5·88 per cent. The coal and cannel used amounted to 293,716 tons, which was an increase of 12,516 tons, or 4·45 per cent. The quantity of gas sold, including that used on the works, gasholder stations, &c., was 2,724,147,800 cubic feet—an increase of 150,456,800 cubic feet, or 5·84 per cent. The amount of gas made per ton of coal carbonized was 10,271 cubic feet, as compared with 10,132 feet; and the quantity sold per ton was 9274 cubic feet, as against 9152 feet. During the year 47,036 yards of new mains were laid for the supply of gas to new streets, and 8831 yards laid in place of smaller and defective mains, varying in size from 3 inches to 24 inches; the total being 31 miles 1307 yards. The number of gas-engines in use on June 30 last was 864—an increase of 59 on the previous year; the engines ranging from ½ to 60 horse power. The number of gas-stoves increased by 544, automatic stoves by 474, and automatic meters by no less than 2848. The income from this source during the year amounted to £6509, as compared with £2988 the previous year. The revenue account has been charged during the year with £14,677 on account of the sinking fund, which on March 25 last amounted to £320,192, of which £131,049 has been applied to repayment of debt. The amount invested, and ultimately to be applied in the redemption of debt, is £189,143. The revenue account shows a net profit of £37,448 on the year's trading. After deducting the sum of £14,677 set aside for sinking fund purposes, there remains a surplus of £22,771. During the year there has been transferred from the reserve fund to the city fund £20,351, and also £10,000 to the gas-works depreciation fund. The amount now remaining in reserve and unappropriated is £22,737. As compared with the previous year, the income from the sale of gas, residuals, and sundries has increased by £21,784. On the expenditure side of the account, there is an increase of £1194 in wages, purification, repairs, &c., while the cost of coal has advanced by £6493. The capital account has been enlarged by the sum of £68,248. Of this £23,872 has been expended on works of extension and improvement at Meadow Lane, £31,948 on the New Wortley works, and £2705 at York Street, while £21,281 has been expended on mains and services, £10,063 on meters, and £2250 on gas-stoves. The average illuminating power of the gas during the year, as shown by the Corporation officials' tests at the works, was 18·22 candles; and the average sulphur impurity 16 grains per 100 cubic feet. The average illuminating power and sulphur impurity, according to tests made by the City Analyst, Mr. Fairley, were as follows: Illuminating power, tested by 24-hole argand burner, 18·1 candles, and sulphur impurity 15·48 grains per 100 cubic feet.

LEICESTER CORPORATION GAS AND WATER SUPPLY.

Half-Yearly Report and Accounts.

At the Quarterly Meeting of the Leicester Town Council last Tuesday, the reports of the Gas and Electric Lighting and Water Committees for the half year ending June 30 were submitted.

The Gas and Electric Lighting Committee stated that the accounts of the gas undertaking showed a net profit, after paying interest on capital, of £20,017. Out of this had been paid £4723, being the half-year's amount of sinking fund; leaving a balance of £15,294 to be applied at the end of the financial year. The result of the working of the Electric Lighting Department was a net profit, after charging £1068 on sinking-fund account, of £337.

Alderman Lennard, in moving the adoption of the portion of the report relating to the gas accounts, said they had expended £904,704 of the capital of the undertaking, and had still borrowing powers for £113,111, besides having unspent of that which they had borrowed a sum of £37,103. Of the total they were spending £40,000 on water-gas plant; and he believed the £100,000 they would then have left would last between four and five years. With regard to the half year, the total expenditure was £77,768, an increase of £5721; and the revenue was £112,415, being an increase of £14,554. Altogether the balance-sheet was one of the most favourable that it had been his pleasure to submit to the Council. It showed the largest profit ever made in any half year, though not the largest net profit, being third on the list in that respect. There were, however, clouds on the horizon. They had had to pay 1s. 6d. per ton more for coals for the ensuing twelve months than they had been previously paying; and unless they had advantages similar to those in the present balance-sheet, this meant £6000 less profit for the current half year.

Mr. Edwards seconded the motion, which was adopted.

Alderman Lennard next moved the adoption of the part of the report referring to the Electricity Department. He said they had earned a net profit at the rate of 5¾ per cent. on the total capital invested—£91,000. The profits had been such that, had they been a private company, they could have fairly paid a dividend of 5 per cent. from the very first; and a company would not have had to create a sinking fund, which the Committee were bound to do to redeem the capital. This year they had arranged to reduce the price from 5d. to 4d. per unit, and anticipated that the increased business would compensate them for the decreased price.

Mr. Edwards seconded the motion, which was also unanimously carried.

The Water Committee reported that their accounts for the half year showed a net profit, after paying interest on capital, of £7724. Out of this had been paid £3018, the half-year's amount of sinking fund; leaving a net balance of £4706. The Committee proposed to carry this balance to the credit of the special water fund authorized to be created under the Derwent Valley Water Act. The Committee recommended the appointment of Aldermen Wood, Coleman, and Vincent, and Mr. Biggs to represent the Council on the Derwent Valley Water Board until November, 1900.

Alderman Wood, in moving the adoption of the report, said it was very gratifying to find that the profits of the department were more than bearing out the predictions made a year ago. At one time, before they entered on the Swithland works, they reached a profit of about £10,000 a year. The growth of the business had enabled them to pay the interest and sinking fund on the very large amount of capital that was spent on the works, and had left them the very handsome balance at the end of the year of £7724. Out of this £3018, the half-year's sinking fund, had been placed to the credit of that account; leaving a profit of £4706 to be carried to the fund mentioned in the report. This was an increase on the corresponding half year of about £2000, which he thought would be gratifying to every member of the Council, and also to the public at large. In reference to the new works, Alderman Wood said the Committee had been able to realize what they hoped they might do when they went to Parliament—viz., that the interest on the capital expenditure should be added to capital during the construction of the works, and that the sinking fund should be suspended until the first portion of the works had been completed, giving them practically 60 years from 1909 to repay the capital debt, instead of 60 years from 1899.

The report was adopted.

KEIGHLEY CORPORATION GAS SUPPLY.

A Prosperous Undertaking.

At the Meeting of the Keighley Corporation on Wednesday, the report of the Gas Committee, to which reference was made in the "Journal" last week, showing a surplus of £7665 on the working of the gas undertaking in the twelve months ending the 30th of June, was presented. It was accompanied by one by the Gas Engineer and Manager (Mr. J. Laycock), which furnished statistical and technical details; the former prepared by Mr. A. Lister, the Borough Accountant. The total revenue was £40,742, of which £31,966 was for gas (inclusive of public lighting, allowed for in the net revenue account), £4992 for coke, £1617 for tar, and £1882 for sulphate of ammonia. The expenditure was £25,738, of which coals stood for £14,532. The gross profit was £15,004, which was transferred to the net revenue account, the expenditure on which amounted to £7339; leaving the above-named surplus of £7665. In the remarks accompanying his report, Mr. Laycock pointed out that the receipts for gas show an increase of £1406 over the previous year's figures; coke, an increase of £317; tar, a decrease of £108; and sulphate of ammonia, an increase of £349. The amount received for coke per ton of coal used was 3s. 6·5d., against 3s. 5·9d. the previous year; for tar, 1s. 1·8d., against 1s. 3·4d.; and for sulphate of ammonia, 1s. 4d., against 1s. 1·7d. The total receipts for residuals per ton of coal used were 6s. 0·3d., against 5s. 11d. Coming to the expenditure side, the coal (inclusive of carriage and unloading) cost 10s. 3·7d. per ton, against 9s. 9·6d. per ton the previous year; purifying materials and labour, 2·6d. per ton of coal, against 1·8d.; stokers' wages were 2s. 10·3d. per ton, against 2s. 9·5d.; yard wages, 2·4d. per ton, against 4·5d. The last is, however, only an apparent reduction, as wages for coke storing and loading have been, and will in future be, charged to the coke account.

The total amount by which the rates will benefit out of last year's gas profits is £5062. The Committee propose to create an insurance fund, not only to cover claims under the Workmen's Compensation Act, but also loss by fire and explosions. As the old reserve fund, on which there is a balance of £957, is about exhausted, Mr. Laycock recommended that it should be closed, and a renewals fund created, to be kept up by a fixed sum of 4d. per 1000 cubic feet taken annually from the gross profits. He also gave the different items worked out at per 1000 cubic feet of gas sold. The receipts averaged (with public lighting) 2s. 4·5d.; the cost of gas, 1s. 3·1d.—leaving a gross profit of 1s 1·4d. The quantity of coal used (3·3 per cent. of cannel) was 28,204 tons; of gas made, 281,685,000 cubic feet, or 9987 cubic feet per ton of coal used; of gas sold, 271,814,000 cubic feet, or 9638 feet per ton of coal used; of coke sold, 12,322 tons, or 8 cwt., 2 qrs., 27 lbs. per ton of coal used. The coke receipts were £4992, or 8s. 1·2d. per ton; the tar receipts, £1617, or 18s. 3·2d. per ton; the sulphate of ammonia receipts over expenses, £1882, or £7 0s. 5·6d. per ton. The percentage of residuals on the cost of coal equals 58·5 for last year, against 60·4 in 1897-8. The price of gas within the borough was reduced on the 1st of July to 2s. 3d. per 1000 cubic feet, with 5, 7½, and 10 per cent. discount according to quantity consumed. This brings down the net price from 2s. 1·65d. to 2s. 0·3d. The reduction is equal to £2500; and it will reduce next year's surplus to that extent if the consumption is not considerably increased.

The adoption of the Committee's recommendations as to the disposal of the surplus, was moved by Alderman Paget, who referred with pleasure to the gratifying report which the Gas Engineer had been able to present, and which, he thought, showed that the gas-works had been very satisfactorily managed from a business standpoint. He considered that the present report was more satisfactory than any previous one. The gas sold during the year showed an increase of 13 million cubic feet, or 5 per cent., upon the previous year. This was accounted for very largely by the greater number of meters and cooking-stoves in use. He might say that if the consumption of gas went up as it ought to do with the reduction in price that had been made, there was every probability that the Committee would be able to hand over £2000 to the rates next year as usual; and this sum, he thought, considering the new claims upon the gas profits, was not at all a despisable one. Mr. Walsh seconded the motion; and it was carried.

Barnsley Water Finances.—The accounts of the Barnsley Corporation for the year ended March 31 last have been issued. They include a statement referring to the water undertaking; and from it it appears that the income amounted to £17,810. The sum of £7370 was transferred to the reserve fund, from which £2000 was taken for the general district rate. The balance in hand on March 31 was £8779. The charges for domestic supplies of water amounted to £8091; and for meter supplies, to £9325. The total expenditure on the Ingbirchworth water-works is entered at £127,781, and on the new Midhope works, in course of construction, the sum expended to March 31 last was £62,092—the amount borrowed on this account being £94,216.

INCANDESCENT GAS LIGHTING FOR ST. SAVIOUR'S, SOUTHWARK.

The St. Saviour's, Southwark, District Board of Works will at their next meeting have before them, and in all probability will adopt, the following report from their General Purposes Committee: We have further considered the question of incandescent gas lighting, and, in accordance with the resolution passed on the 21st of December last, have given instructions for the system to be adopted throughout the district for the public lamps. At our meeting held on the day of the date of the report, the Surveyor submitted a report (dated Sept. 27, 1899) supplementary to the one dated November last, which was printed and circulated among the members of the Board, such report being as follows: "The number of public lamps in the district at present is 556; this without special or obelisk lamps. I would suggest that the following five principal streets should be lighted with special lamps: Blackfriars Road, 36; Stamford Street, 9; Southwark Street, 34; Southwark Bridge Road, 24; Borough High Street, 30—total, 133. The remaining 433 lamps I suggest should be converted. These would have a No. 2 burner, and give an illuminating power of 50 to 60 candles. These lamps are charged £1 each for converting, and will cost for gas, upkeep, and every expense, £2 10s. per annum. Our expenses will be as follows: 133 special lamps, at £2 10s., £332 10s.; 423 converted lamps, at £1, £423—£755—leaving £755 to pay off. By paying our full amount of 63s. 9d. per lamp on 423 lamps, we liquidate our debt at the rate of 13s. 9d. per lamp per annum, or a gross sum of £290 16s. 3d. per annum, and at this rate will clear our indebtedness in just over 2½ years."

THE GAS-WORKERS' UNION AND AN EIGHT-HOUR WORKING DAY.

There was a large labour demonstration in Nottingham on Sunday week, the arrangements for which were carried out by the Nottingham branch of the Gas Workers' Union. After a procession through the city a mass meeting was held, at which Mr. S. Bower presided; and he was supported by, among several others, Mr. Will Thorne, the General Secretary of the Union. In opening the proceedings, the Chairman said the Union under whose auspices they were assembled had been in existence about ten years; and at the present time had about 45,000 members, with a balance in the bank to the amount of about £8000. He remembered that, when the Union was inaugurated, a lot of older trades unionists dubbed it a "tu'penny Union." At the time the Gas Workers' and General Labourers' Union made application to join the District Trades Council, the question was raised whether it was advisable to take them in, seeing that their subscriptions were so small, and that the benefits to the members were out of all proportion to the small contributions paid in. However, the Trades Council admitted them; and he (Mr. Bower) considered the Union were quite justified in the course they had taken. One lesson he thought they ought to learn from the gas workers was the need of a national federation. The Gas Workers' and General Labourers' Union was a federation on a small scale, for it included all classes of labouring men. They had been tried ten years—a very fair time; and he need only refer back to the engineers' strike, when a great number of labourers were thrown upon its funds. Notwithstanding the great drain upon the funds, the Union was, he was happy to say, as pretty well off at the end of the dispute as it was when the struggle commenced. Mr. J. Thornloe, Treasurer of the Nottingham and District Trades Council, moved the following resolution: "This meeting is of opinion that an eight-hour working day is one of the most important steps towards the ultimate emancipation of the working classes, and pledges itself to use every endeavour in helping to bring about this reform." In a short speech, he said one of the most important steps to be taken before they could gain an eight-hour day was the thorough organization of the working classes. Mr. Thorne, in supporting the resolution, said that at the time the Gas Workers' Union came into existence in 1889, the conditions of labour were very bad indeed. For instance, he himself was away from home fourteen hours a day, commencing work at five in the morning, and finishing at seven in the evening. When the workmen approached the managers and engineers of the gas-works they received no consideration at all, and were politely told that the dividends would not permit of shorter hours and increased pay. The Union was therefore organized; and within the short space of six months from the time it was established, they were in a position to demand and obtain an eight-hours day for all gas workers in London. He thought it would be admitted that if the Union had done nothing else than this, it had been the means of conferring a great benefit, not only upon the gas workers, but upon men who at that time had nothing whatever to do with the manufacture of gas. They calculated that the Union had been the means of employing no less than 10,000 men, who, under the old twelve-hour system, were unable to find employment. He was thoroughly convinced that, if all the working men could see the far-reaching benefits which had resulted from the eight-hour system, they would not be so apathetic to the proposal embodied in the resolution. If an eight-hour day was established, it would be impossible for the employers to make an attack upon the organized workers in regard to increasing their hours of labour. In his opinion, a general eight-hour day would be the means of employing 250,000 more men than was the case at the present time. The resolution was unanimously carried.

ELECTRIC LIGHTING NOTES.

The electric light works of the Leigh District Council are approaching completion; and it is expected that lighting will be commenced in November. For the purpose of the scheme, the Council effected a loan of £10,500 with the Public Works Loan Commissioners.

The General Purposes Committee of the West Bromwich Town Council have decided to again recommend the Town Council to make application to the Local Government Board for permission to borrow £30,000 to be expended in plant and mains for lighting and motive purposes.

Colonel W. Langton Coke conducted a Local Government Board inquiry at Birkenhead, last Friday week, in respect of an application by the Town Council for power to borrow £5000, for the purpose of supplying electricity to outlying townships. There was no opposition.

Owing to the failure of the electric light at Tunbridge Wells, due to the bursting of a tube in the boiler of an engine at the Corporation works, the town was wrapped in darkness for about two hours on Monday night of last week. Pedestrian and vehicular traffic was greatly interfered with, and tradespeople resorted to candles for illumination.

The Crewe Town Council a short time ago obtained the sanction of the Local Government Board to borrow £26,000 for electric lighting in the borough. As the Co-operative Stores are setting up an independent installation for their own premises, Messrs. Hopkinson and Talbot, the Engineers for the Corporation scheme, have advised the Council to enlarge their radius, and borrow an additional £8000.

The formal opening of the new electricity works of the Darwen Corporation took place on Wednesday last. The works have been completed at a cost of £24,000; £6000 of the borrowing powers having been reserved for probable extensions. A reception was held at the works during the afternoon, and at night the members of the Corporation were entertained to dinner by the Mayor and the Chairmen of the Electricity and Health Committees.

The Ross District Council are considering an electric lighting scheme, which it is estimated will cost £13,000. The Engineer's computations as to future results are all on the right side; and he concludes that, with a little judicious advertising and adequate canvassing, there will be no necessity to call upon the rates after the first two years' working. The councillors, however, are hesitating, and seem disinclined to take upon themselves the heavy responsibility involved, without consulting the ratepayers.

In the course of the meeting of the Electric Light Committee of the Bath Corporation last Friday, mention was made of a breakdown of the public arc lamps on one circuit on the 17th ult. It appeared that the failure was due to the cables giving way at the connection with one of the lamps. The remedy suggested is that separate connection cables should be fixed to each lamp, at an estimated expense of £2 10s. to £3 per lamp. A Sub-Committee are to consider whether or not this additional expenditure shall be incurred.

The Chelmsford Town Council have again occasion to complain of the electric light in the town; and last Wednesday, they decided to write to the Company calling their attention to the unsatisfactory state of both the public and private lighting. The Chairman of the Lighting Committee mentioned that they had "very seriously considered" the question. Only on the previous Saturday evening, the whole of the lights in the town were extinguished. The Committee purpose inquiring into the advisability of applying for a Provisional Order to enable the Council to put down an installation.

The Electric Lighting Committee of the Stoke Town Council reported last Thursday that it was advisable to adopt the low-pressure continuous-current system at as high a voltage as the Board of Trade would permit; that an electric lighting plant could not be economically or satisfactorily worked in conjunction with a refuse destructor; that it appeared desirable to have the electric station, if practicable, near to the gas-works, the canal (for cheap deliveries of slack), and the Trent, from which water could be obtained at a nominal cost for purification. The Council adopted the report, subject to the approval of Mr. J. N. Schoolbred, who will visit the district at an early date.

There is every probability of the resuscitation of the electric power schemes of last session for South Lancashire and North Cheshire. The proposals of the Companies will be varied from those propounded last year, and possibly they may be presented in such a shape as not to conflict with each other. But Manchester and Liverpool, and all the large and small local authorities surrounding them within a distance of about 20 miles, will be covered by the schemes. As yet the plans of the promoters are not perfected; and it is stated that they are anxious too much prominence shall not be given to them. There is some talk of "giving" the larger places—those with populations of, say, from 50,000 up—a power of veto; but (remarks one newspaper) what may become of the smaller local authorities, there is no telling. One thing is, however, certain—that there will be no failure at the Standing Order stage this year.

The Uxbridge District Council have extracted from the Board of Trade an interesting pronouncement on the following points: (1) Whether, in the case of a local authority obtaining a Provisional Order, they are able to lease or sell it; and (2) whether they are bound to carry out the works referred to in the Order within the time mentioned in the Order, or can they get an extension if required? The reply of the Board is that they have decided to omit from any Provisional Order granted to a local authority the power to transfer their undertaking, save in exceptional cases, where very special reasons can be shown. It is added that the Board do not appear to have any power to extend the time prescribed by a Provisional Order for the execution of the compulsory works. In a subsequent communication, the Board define "transfer" as mentioned in the foregoing to mean "a transfer of powers, duties, and liabilities under Provisional Order, but does not include any contract made under section 11 of the Electric Lighting Act, 1882."

The first note of criticism respecting the electric lighting of Plymouth is that the streets are dark in the early morning. After eleven o'clock at night, every alternate arc lamp is switched off; while at five in the morning the remainder are extinguished. Under these circumstances, the contrast between the darkness of the principal thoroughfares and the gaslit streets—especially those in which incandescent gas-lamps are placed—is strong enough to cause serious complaint from those whose business takes them out in the early morning. Another complaint is that the Corporation have not made provision for the arc lighting of the whole of the streets through which the electric tramway is laid. Two or three people have written to the papers grumbling at the apparent lack of oversight in this matter. It is clear, however, that the people who grumble know nothing of the additional cost of the electric light. What they regard as an oversight was, of course, deliberate policy on the part of the Corporation, who do not want to make the lighting bill heavier than they consider necessary.

Just before the close of the sitting of the Liverpool Consistory Court, last Tuesday, Archdeacon Madden asked permission to bring before Chancellor Espin a matter of interest to some clergy and wardens in

the diocese. In recent years, the electric light had been introduced in place of gas in several churches; and the question of obtaining a faculty for the change had not occurred to anybody. It had been simply considered as the substitution of one light for another. The Chancellor replied that by the Act of 1874 it was distinctly prescribed that no alterations whatever of a permanent character were to be made in a church without a faculty. It was almost impossible to lay down any general principle as to the alteration of light; each case must stand on its own merits. It might seem a small matter to substitute one light for another; but it was a permanent alteration, and if one incumbent and set of churchwardens made such an alteration without authority, it constituted a precedent which others might follow in matters more debateable. It was the business of the rural deans to visit the churches, and if they saw unauthorized alterations to report them, so as to bring to order those who transgressed the law.

Reference was made in the "Electric Lighting Memoranda" last week to a serious breakdown in the electricity supply at Manchester on the 19th ult., and since then there have been two other disturbances in the distribution system which have caused partial failure. The first fault occurred during the night on Sunday last week in Oxford Street and Stretford Road; and the second on Tuesday morning in Cross Street. In the latter case the strength of the current was reduced for a short time by about one-half; but, the occurrence happening during daylight, no great inconvenience was felt. In the newspaper reports of these failures, their gravity has been minimized as much as possible. Referring to the breakdowns and deficiencies in the service, a correspondent of the "Manchester Guardian" states that he is associated with more than one place of business in which the electric light was adopted at its introduction by the Corporation; and during the past two years it has been found necessary to put in new gas fittings through the uncertainty of the light. Alluding also to the decision to combine the electric tramway service and lighting system, he ventures the opinion that it is most desirable the two systems should be worked separately. What, he asks, would be the effect upon the tramways if an accident occurred like the one on the 19th ult. at the generating station? He supplies the answer: "Streets in darkness, and a huge block of trams and dislocation of traffic." To show that the Committee are not proof against mistakes, he states that they have now found it necessary to relay the tram-lines at a cost of £250,000; while not having to relay the lines was one of the strong arguments against adopting the underground system of working the trams.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Edinburgh and Leith Gas Commissioners on Monday struggled with the question of the price of gas for the year from the next survey. The struggle was not a prolonged, nor a severe one; for they transacted that and other important business in the compass of about a minute and a half. It is not to be supposed—and I do not mean to say—that the business was carried through without proper consideration; for it had all been dealt with in Committee. But the rushing through of two months' business [there was no meeting of the Commission in August] in so short a space of time, is to make meeting in public unnecessary. In the minutes which were adopted, it was shown that there has been an increase in the output of gas since May 16 of 20,831,000 cubic feet over the corresponding period of last year, and an increase of 706 in the number of gas-cookers fixed. There are now 3754 cookers in use. Regarding the price of gas, the Treasurer (Mr. J. S. Gibb) submitted estimates, in which he adopted, as a probable revenue, £286,273, as compared with an actual revenue of £266,754 last year. He estimated £251,034 to be derived from the sale of 1,673,561,000 cubic feet of gas, as compared with a revenue of £242,600 from the sale of 1,645,318,500 cubic feet of gas last year. From coke, he estimated a revenue of £10,540, as compared with £5853; and from tar and ammoniacal liquor, £24,033, as compared with £17,576. On the expenditure side, he estimated the cost of coal at £99,470, as compared with £84,465; of oil at £8218 as compared with £7496; of purifying materials, oil, water, and sundries, at £10,775, as compared with £9241; the amount of salaries and wages at works at £43,099, as compared with £41,395; and repairs of works and plant at £13,930, as compared with £13,469. The total anticipated cost of the manufacture of gas was £175,492, as compared with £156,067. The cost of distribution was estimated at £26,090, as compared with £25,168; management at £8940, as compared with £8932; feu-duties, rates, and taxes at £9300, as compared with £11,999; and pensions and allowances at £950, as compared with £798. The total expenditure was estimated at £285,357; leaving a surplus of £916. The Treasurer also reported: "In determining this estimate, I have had the benefit of the aid and experience of the Chief Engineer, who has carefully examined and approved the items belonging specially to his own department. Supposing the price of gas to be continued at its present rate of 3s. per 1000 cubic feet, the estimate shows a probable surplus of £916. One penny per 1000 cubic feet at present represents £6810; the estimated surplus is therefore only about one-seventh of a penny. My calculation takes for granted the continued suspension of the sinking fund for repayment of money borrowed for new works at Granton; and the minimum statutory allowances for the other sinking funds. Interest has been increased by 3 per cent. on £50,000, likely to be expended this year on the new works, in addition to what has already been borrowed." The Works Committee recommended that the Commissioners should continue to supply gas of from 24 to 26 candle-power, at a charge to ordinary meter consumers of 3s. per 1000 cubic feet. This recommendation was adopted.

The Treasurer also reported that, as authorized on May 8 last, he had borrowed on short loans the sum of £31,400; and that he calculated the Commissioners would require to borrow at Martinmas, on capital account, the sum of £100,000, to meet (1) £41,300 of mortgage debt then repayable, (2) £23,000 shown in the accounts to Whitsunday last as having been paid out of revenue on capital account, and (3) £20,000 or £30,000 of subsequent capital debt in connection with the Granton works. The Commissioners remitted to the Finance and Law Committee to borrow £100,000 on mortgage.

The Finance and Law Committee reported that the Assessors had valued the Commissioners' undertaking for the current year as follows: Edinburgh, £42,466, as compared with £43,969 last year; Leith, £10,698, as compared with £9806; Portobello, £2594; County of Mid-Lothian, £1902, as compared with £1585; and annexed district, £980. There is a net increase of £3280.

The Gas Workers' and General Labourers' Union are resolved, if possible, to give trouble to the Glasgow Corporation Gas Department. Last night a meeting was held in the Bridgeton district, which is near the Dalmarnock works—the works which, being old, are about to be abolished, and which, being minus modern equipment, offer the best field for the promotion of discontent. Mr. John Cronin, the General Secretary of the Iron and Steel Workers' Society, presided. The meeting was called for the purpose of hearing an address from Mr. Pete Curran. He said that "since the Glasgow men had joined the Union, and since the Gas Committee had decided upon giving a general advance in wages, with other alterations and concessions, a good many of the decisions of the Committee had been violated by the District Manager. One point in the Committee's agreement was that ratepayers who were qualified should have the preference of employment. This had not by any means been carried out. Then there were some sections of the men who had not received the advance decided upon by the Committee; and attempts were being made to put extra work on certain classes of the men. There were many grievances which, if not seen to by the management, would have to be seen to by the Committee, if peace were to be maintained among the Glasgow Corporation workmen." Then he proceeded to urge the workmen to be united. It is not said that anything was done, so I conclude that the meeting was merely an "organizing" one. That being so, the statements need not be closely looked at, as everyone who has goods to sell likes to put the best face upon them. This much, however, may be said—that if any of the District Managers in Glasgow are not carrying out any agreement with their men (not with the Union), it is not to the men that complaint should be made, but to the Corporation Committee. The District Managers are not the men to go against the instructions of the Committee. They have no interest in doing so. Their only interest is to get value from the men for the wages which are paid to them; and workmen who do not like work would then have cause for grumbling. It seems to me that the attempt is being made to manufacture grievances. The Union officials seem to look upon the Corporation Committee as squeezable, and to have made up their minds to get as much as they can from them.

Is the coal boom of 1899 on the wane? In order to be able to answer this question, consideration must be given to the cause of the boom. Improved trade will be generally replied; but what has been the cause of the improvement of trade? Chiefly, I unhesitatingly say, the state of unpreparedness which the United States of America found themselves in on the outbreak of war with Spain, coupled with the adoption of a forward foreign policy by the States. Proof of this view is to be found in the fact that before the war goods from the States were being sent across here, doubtless for advertisement purposes, with a view to the opening up of markets in other parts of the world; and that instead of having iron goods to export, the States are now importing from this country. Concurrently, and proportionately, with their great activity in manufacturing for themselves, the markets which they served have been opened up to British manufactures. We ourselves have also been passing through a period of enormous activity in the preparation of war materiel. The vast amount of work in the iron trades has been responsible for the great demand for coal; and the iron trades have been busy because of the heavy preparations for war which have been in progress in all lands. This spectacle of a world arming itself to the teeth is not calculated to lead to complacent reflections generally. It is said that when a nation becomes possessed of a fine army, they wish to use it. This points to a poor outlook for peace. In the event of war, there will be an immense demand for stores of all kinds; and the nation which is free to supply them will amass wealth. We have not reached war on a grand scale; and the inference is plain that, till this event arrives, the work of preparation for it must, after a time, not cease, but slacken. Is it that which is about to happen? Whether it be so or not, it is becoming apparent that coal exports are falling off; and the action of the Fife coalmasters in reducing the price of coal at a period of the year when rates are usually advanced, points to prospects not being bright. The indications are that, in the absence of international conflict, coal will very soon be cheaper than it has been.

The Arbroath Gas Corporation on Thursday resolved to advance the price of gas from 3s. 11½d. to 4s. 2d. per 1000 cubic feet. Mr. Sutherland, the Convener of the Finance Committee, in moving the increase, explained that it was chiefly due to the rise in the price of coal. But it was, he said, a fortunate circumstance for them that they had a large stock of coal in hand previous to the rise, otherwise matters would have been worse for them. The advance was 2s. 4d. per ton; but by working the old stock with that recently purchased, they were able to reduce the advance to an average of 1s. 6d. per ton. On 6623 tons, the enhanced price amounted to £497. A sum of £250, which appeared formerly in the property account, had been transferred to the contingent fund. Owing to the change in the date of closing their annual accounts, there were wages to pay for six weeks more this year than in other years. This represented a sum of £241. These changes, and the rise in the price of coal, represented a sum of £988 extra which they would have to raise. This would be partly met by better prices for residual products. The additional revenue from tar was estimated at £204, and from sulphate of ammonia at £144—together £348, leaving a balance of £640 to be provided for. The rise in the price of gas of 2½d. per 1000 cubic feet, upon 52¾ million cubic feet, would amount to £544, which would still leave an adverse balance of £96. This sum the Manager (Mr. R. S. Carlow) assured the Committee he would meet by rigid economy, and by the curtailment of various items which appeared in the estimates, without in any way impairing the efficiency of the works; and there would still be left a favourable balance of a few pounds. One member thought the proposal was sailing far too close to the wind; but Mr. Carlow said he was satisfied it could be done, as there was every reason to believe that the price of sulphate of ammonia would keep up. The Corporation were satisfied with Mr. Carlow's assurances; and they agreed to the increase in price.

Mr. J. Thomson, Manager of the Inverness Corporation Gas-Works,

has reported, for the past year, that while the whole works are in good order, some parts are now too small for the quantity of gas made. All the retorts will be required in the forthcoming winter; and if any breakdown occurs, it will be a serious matter. Three years ago four ovens, each containing four retorts, were converted into regenerative settings upon Hislop's patent; each oven containing eight retorts, and thus practically doubling the number of retorts. The setting has given excellent results. The remainder of the retort-bench is showing signs of giving way, and will require to be renewed next year. Mr. Thomson recommends that it should also be converted into the regenerative system. This would give them 40 retorts where they have only 24 at present. The total number of retorts in the works would thus be raised by the regenerative system from 36 to 72. The additional retort power would give them a margin of 20 per cent. to fall back upon. The condensers are much too small for the quantity of gas required to pass through them; there being only 3½ square feet of condensing surface per 1000 cubic feet, which is over 100 per cent. less than is required. There has been no addition to the condensers since the Commissioners took over the works in 1875, though the make of gas has increased from 17 to 72 million cubic feet per annum. The steam-engine has been in use for fifty years, and is now too small for the work required of it; but as the retort-bench and the condensers are more pressing matters, the renovation of the engine might be left over to another year. The quantity of coal carbonized during the year was 7880 tons, and the gas made 71,750,000 cubic feet, an increase of 7·85 per cent. on the previous year's make. The quantity of gas sold was 66,770,000 cubic feet; leaving 5,230,000 cubic feet, or 7·26 per cent., unaccounted for, which was 1 per cent. less than in the previous year. During the year 250 new consumers were added, of whom 84 took prepayment meters. The total consumption by prepayment meters was 1,259,000 cubic feet. There was a surplus of £576 on the year's working, notwithstanding that the price of gas was reduced from 3s. 9d. to 3s. 4d. per 1000 cubic feet from and after the November survey. If the price had been reduced for the whole year, there would still have been a surplus of £100. In the year now current, there would be an increase in the price of coal of £700. In several towns the price of gas had been raised. There was a considerable increase in the price of residuals this year; and this, along with an expected increase in the consumption of gas, would, he hoped, counterbalance the extra cost of coal. He would, therefore, recommend that the price of gas should be continued at the same rate. The Commissioners agreed, and remitted to a Committee to consider Mr. Thomson's proposals with reference to the extensions at the works. The works are, as Mr. Thomson says, in good order. When they were erected, the leaning of engineers was towards much greater substantiality than is now considered advisable. The buildings in which the Inverness works are located are built of heavy stone, as if they were intended to be for all time. This has its drawbacks, as well as its advantages. The chief disadvantage, of course, is that the substantiality of the buildings prevents the adoption of modern methods, as people hesitate to take down costly structures. This is the case in Inverness. It is possible that a comprehensive reconstruction of the works would pay; but it would be at a very long interval of time, and is not to be thought of. The existing works must serve for many a day. Though they are not laid down on a model which a modern gas engineer would recommend, their design does not seem to prejudice the working, which is another illustration of the fact that a good workman does not depend so much upon the tool he uses as upon the skill with which he handles it. That gas should be sold at 3s. 4d. per 1000 cubic feet in Inverness, considering the long carriage, is little short of amazing. There are towns situated on the edge of the coalfield, which cannot get so low in the matter of price.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Sept.* 30.

Sulphate of Ammonia.—The action of the London makers in dropping their price has brought about a further decline in values all round; and the closing quotations are £11 10s. to £11 13s. 9d. per ton, delivered f.o.b. at the ports. Makers continue to offer their production as it becomes available, while buyers can only be induced to operate at constantly declining prices. London, Beckton terms, is reported to have been sold for October-December delivery at £11 7s. 6d. per ton; but Scotch makers are holding for £11 12s. 6d. to £11 15s. for the same position, though speculators continue to offer at less money abroad.

Nitrate of Soda is rather dearer; and the quotation for good quality is 7s. 7½d. per cwt., while that for refined is 7s. 9d. per cwt.

LONDON, *Sept.* 30.

Tar Products.—A moderately steady market has characterized the week. Heavy and grease oils are realizing better prices; while for creosote, most makers being well sold, there is little offering, and no business of importance noted. A more permanent outlook for naphthalene salts has sprung up, which is some relief; and although the price is low, it is a useful outlet for an inconvenient product. There is no change of moment in benzol. Pitch is moving off freely at former rates; and there is a little better inquiry for various grades of naphtha.

Values obtained during the week are: Tar, 16s. 6d. to 25s. Pitch, east coast 35s., west coast 33s. 9d. Benzol, 90's 8¼d., 50's 9¼d. Toluol, 1s. 2d. Solvent naphtha, 1s. 2½d. Heavy naphtha, 1s. 2d. Crude, 30 per cent., naphtha, 4¼d. Creosote, 3½d. Heavy oils, 72s. 6d. Carbolic, 60's 2s. 1d., 75's 2s. 7½d. Creosote salts, 50s. Anthracene, nominal, "A" 3½d., "B" 2½d.

Sulphate of Ammonia.—A serious relapse has taken place in this market; and although very little business is being done at the low prices quoted, values are marked at: Beckton, £11 5s., London £11 10s., Hull £11 8s. 9d., Leith £11 7s. 6d., Glasgow £11 10s., and West coast £11 10s., less 3½ per cent. discount.

New Water-Works for Todmorden.—At the meeting of the Todmorden Town Council last Wednesday the water-works question was the chief topic of discussion. It was decided to proceed at once with the construction of a new reservoir at Gortley and Howroyd, within the borough, and to make application to the Local Government Board for their consent to the Council issuing stock amounting to £50,000, bearing interest at 3 per cent.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 813.

Issue.	Share.	When ex-Dividend.	Dividend or Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 13	10½	Alliance & Dublin 10 p.c.	22—23	..	4 11 4
100,000	10	,,	7½	Do. 7 p.c.	15½—16½	..	4 10 11
800,000	100	July 8	5	Australian 5 p.c. Deb.	102—104	..	4 16 2
200,000	5	May 12	6	Bombay, Ltd.	6—6½	..	4 12 3
40,000	5	,,	6	Do. New, £4 paid	4½—4¾	..	5 1 1
880,000	Stk.	Aug. 16	12	Brentford Consolidated	277—282	..	4 5 1
270,000	,,	,,	9	Do. New	210—215	..	4 3 9
50,000	,,	,,	5	Do. 5 p.c. Pref.	140—145	..	3 9 0
159,375	,,	June 15	4	Do. 4 p.c. Deb.	126—130	..	3 1 7
220,000	Stk.	Sept. 15	11½	Brighton & Hove Orig.	265—265	..	4 6 9
226,320	,,	,,	8½	Do. A. Ord. Stk.	190—195	..	4 7 2
973,500	Stk.	Aug. 16	5	Bristol, 5 p.c. max.	125—130	..	3 16 11
430,000	20	Sept. 29	10	British	43—45*	..	4 8 11
50,000	10	Aug. 31	12	Bromley, Ord. 10 p.c.	24—26	..	4 12 3
75,000	10	,,	9	Do. 7 p.c.	19—21	..	4 5 8
500,000	10	Apl. 27	6	Buenos Ayres (New) Ltd.	9½—10½	..	5 17 1
220,000	Stk.	June 29	4	Do. 4 p.c. Deb.	100—102	..	3 18 5
150,000	20	July 13	8½	Cagliari, Ltd.	28—29	..	5 13 10
100,000	10	Sept. 29	8	Cape Town & Dis., Ltd.	12⅞—14¼*	+1	5 10 4
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	57—59	..	5 1 8
550,000	Stk.	Apl. 13	13½	Commercial Old Stock	316—321	..	4 4 1
200,750	,,	,,	10½	Do. New do.	245—250	..	4 4 0
200,750	,,	June 15	4½	Do. 4½ p.c. Deb.	143—148	..	3 0 10
800,000	Stk.	June 15	10	Continental Union, Ltd.	183—187	..	5 7 0
200,000	,,	,,	7	Do. 7 p.c. Pref.	182—187	..	3 14 10
51,600	Stk	Aug. 31	14	Croydon A 10 p.c.	335—340	..	4 2 4
168,400	,,	,,	11	Do. B 7 p.c.	235—270	..	4 1 5
555,000	Stk.	Aug. 16	5½	Crystal Palace Ord. 5 p.c.	132—137	..	3 16 8
60,000	,,	,,	5	Do. 5 p.c. Pref.	140—145	..	3 9 0
486,090	10	July 28	11	European, Ltd.	22—23	..	4 15 8
354,060	10	,,	11	Do. £7 10s. paid	16—17	..	4 17 1
14,993,075	Stk.	Aug. 16	4%	Gas-light and Coke	4 p.c. Ord.	103—105	−½	4 13 4
2,600,000	,,	,,	3½		3½ p.c. max.	97—100	..	3 10 0
3,799,735	,,	,,	4		4 p.c. Con. Pref.	122—124	−1	3 4 6
3,993,975	,,	June 15	3		3 p.c. Con. Deb.	103—102	..	2 18 10
70,000	10	May 31	8	Hongkong & China, Ltd.		13½—14½	..	5 10 4
8,800,000	Stk.	May 12	10	Imperial Continental		222—227	..	4 8 1
473,600	Stk.	Aug. 16	3½	Do. 3½ p.c. Deb. Red.		101—104	..	3 7 4
75,000	5	June 15	6	Malta & Medn., Ltd.		5—5⅛	..	5 9 1
560,000	100	Apl. 4	5	Met. of Melbourne	5 p.c. Deb.	112—114	..	4 7 9
250,000	100	,,	4½		4½ p.c. Deb.	110—112	..	4 0 4
541,920	20	May 31	5	Monte Video, Ltd.		12½—13½	..	7 8 1
617,946	Stk.	Aug. 31	9½	Newc'tle & Gateshd Con.		225—230	..	4 0 5
264,855	Stk.	June 29	8½	Do. 8½ p.c. Deb.		106—109	..	3 4 3
						* Ex div.	

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
150,000	5	May 31	8	Oriental, Ltd.	7⅛—8	..	5 0 0
135,000	5	,,	8	Do. New, £4 10s. pd.	6½—7	..	5 14 3
15,000	5	,,	8	Do. do. 1879, £1 pd.	1½—1¾	..	4 11 5
60,000	5	Sept. 29	7	Ottoman, Ltd.	5½—5¾*	..	6 1 9
500,000	100	June 1	6	People's Gas of Chicago 2nd Mtg. Bonds	102—106	..	5 13 2
851,070	10	Apl. 27	7	River Plate Ord.	11½—11¾	..	5 19 2
250,000	Stk.	June 29	4	Do. 4 p.c. Deb.	100—102	..	3 18 5
250,000	10	Sept. 15	10	San Paulo, Ltd.	14¼—15½	..	6 9 0
135,000	Stk.	Sept. 15	10	Sheffield A.	247—249	..	4 0 4
209,053	,,	,,	10	Do. B.	247—249	..	4 0 4
447,427	,,	,,	10	Do. C.	247—249	..	4 0 4
5,600,000	Stk.	Aug. 16	5½	South Metrop., 4 p.c. Ord.	140—143	..	3 14 7
1,530,000	,,	July 13	3	Do. 3 p.c. Deb.	101—103	..	2 18 3
120,000	Stk.	Aug. 31	6	Tottenham A. 5 p.c. and B. 3½ p.c.	141—143	..	4 3 11
250,520	,,	,,	4½		102-104	..	4 6 6
55,100	,,	—	4	Edmonton 4 p.c. Deb.	115—120	..	3 6 8
182,380	10	June 15	5	Tuscan, Ltd.	9—10	..	5 0 0
149,900	10	July 8	5	Do. 5 p.c. Deb. Red.	98—100	..	5 0 0
				WATER COMPANIES.			
746,184	Stk.	June 29	11	Chelsea, Ord.	313—318	..	3 9 2
150,000	,,	,,	5	Do. 5 p.c. Pref.	167—170	..	2 18 10
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	148—153	..	2 18 10
175,785	,,	Sept. 29	4½	Do. 4½ p.c. Deb.	153—158*	..	2 17 0
1,720,560	Stk.	Apl. 18	7	East London, Ord.	207—212	..	3 6 0
654,740	,,	June 29	4½	Do. 4½ p.c. Deb.	155—158	..	2 17 0
890,000	,,	,,	3	Do. 3 p.c. Deb.	101—103	..	2 18 3
700,000	50	June 15	7½	Grand Junction 10 p.c. max.	111—114	..	3 5 9
310,000	Stk.	Sept. 29	4	4 p.c. Deb.	133—138*	..	2 18 0
708,000	Stk.	Aug. 16	14	Kent	358—363	..	3 17 2
160,000	,,	,,	7	Do. New, 7 p.c. max.	208—213	..	3 5 9
1,043,800	100	June 29	10½	Lambeth, 10 p.c. max.	298—303	..	3 9 4
406,200	100	,,	8	Do. 7½ p.c. max.	225—230	..	3 9 7
350,000	Stk.	Sept. 29	4	Do. 4 p.c. Deb.	136—140*	..	2 17 2
500,000	100	Aug. 16	12½	New River, New Shares	430—440	..	3 1 4
1,000,000	Stk.	July 28	4	Do. 4 p.c. Deb.	135—140	..	2 17 2
902,300	Stk.	June 15	7½	Southwark and Ord.	205—210	..	3 11 5
126,500	100	,,	7½	7½ p.c. max.	193—198	..	3 15 9
489,200	Stk.	,,	5	5 p.c. Pref.	167—172	..	2 18 2
1,019,585	,,	Apl. 18	4	Vauxhall 4 p.c. A Deb.	135—140	..	2 17 2
1,155,066	Stk.	June 15	10	West Middlesex	300—305	..	3 5 7
200,000	,,	,,	4½	Do. 4½ p.c. Deb.	154—158	..	2 17 0
200,000	,,	Sept. 15	8	Do. 8 p.c. Deb.	101—103	..	2 18 8
					* Ex. div.		

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—With the commencement of the month, there is a general upward movement in prices throughout the Lancashire district; the Lancashire Sales Association, which represents the Wigan and all the surrounding localities, having advanced pit prices 1s. per ton on round coal and 6d. on engine fuel, while in the Manchester district the leading colliery firms have put up their prices 10d. on round coal and 5d. on engine fuel. In anticipation of these advances, there was a great rush of buying during the past week; but collieries have protected themselves by intimations that orders upon which deliveries could not be made before the close of the month would be cancelled and only renewed subject to customers being prepared to pay the advanced rates. At present, the market is in a somewhat abnormal condition, as business coming forward has been altogether out of proportion to actual requirements; but it is not unlikely that the ensuing month may see a considerable slackening off, as buyers in many cases will have bought to cover themselves forward as far as possible. At the pit, prices may now be quoted at 12s. 6d. to 13s. 6d. per ton for best Wigan Arley, 11s. to 11s. 6d. for Pemberton four-feet and seconds Arley, 10s. to 10s. 6d. for common house coal, 9s. 6d. to 10s. for steam and forge coal, 7s. 6d. for best slack, 6s. 6d. to 7s. for medium, and 5s. 6d. to 6s. for common sorts. For shipment, the basis prices have been raised 6d. per ton on steam coal; bringing the minimum quotation to 10s. per ton for ordinary qualities, delivered at the ports on the Mersey. In some cases, however—and especially on the better qualities—advances of 1s. per ton have been made. Delivered at the ports on the Mersey, prices are now from 10s. to 10s. 6d. per ton for steam coal to 11s. for second qualities suitable for house-fire purposes. For coke, prices are exceedingly strong at full rates; but at present there is no official advance upon the figures that have been ruling recently.

Northern Coal Trade.—There is considerable activity in the Durham coal trade, though less in that of the Northumbrian, through the approach of the closing of the Baltic. Northumbrian steam coal is weaker, as the part named is one of the chief customers; and the price may now be given as 11s. per ton f.o.b.; second-class steam coals are about 10s. 6d., and steam smalls 7s. In the gas coal trade, the demand is large, and is now increasing week by week; the consumption in the great centres showing a large increase in the face of the growth of electricity as an illuminant. Attempts are being made to force up the price of gas coals rather unduly; but 10s. 6d. to 11s. per ton f.o.b. is the current quotation for occasional cargoes, and 9s. 9d. to 10s. is named as the rate at which some of the large export contracts over next year have been concluded. In any case, it will be seen that the prices are more remunerative to the coalowners than those for many previous years. Gas coke is without alteration in price, at about 13s. 6d. per ton f.o.b.

Scotch Coal Trade.—The coal market is reported to be firm, with outputs moving off freely; but this does not quite square with developments which are already visible. In Fifeshire, the coalmasters have formally reduced the price of coal. This is said to be due to the close of the shipping season, which, however, is good for a week or two yet. In Lanarkshire, the miners' leaders are urging them to work only five days a week, which would make it appear as if there was some fear of over-production. The coalmasters have begun to complain of want of railway waggons, which always takes place when they themselves cannot get an outlet for their coal, and keep the railway plant standing full. The prices quoted are: Main 9s. to 9s. 3d. per ton f.o.b. Glasgow, ell 9s. 9d. to 10s. 6d., and splint 10s. to 10s. 6d. The shipments for the week amounted to 169,653 tons—a decrease of 42,204 tons upon the previous week, and of 21,597 tons upon the corresponding week of last week. For the year to date, the shipments have been 6,461,936 tons—a decrease of 796,519 tons upon the same period of last year.

The Stamping of Hiring Agreements.—The Solicitors for the plaintiffs in the case reported under the above heading in the "JOURNAL" for the 19th ult. (p. 706) have published an explanatory letter, in which they state that their clients do not let effects on hire, and do not do business on what is known as the hire-purchase system, but that they sell goods on the system of an out-and-out sale, the purchase-money being payable by monthly instalments. The agreement referred to in the paragraph was on this basis. "Some time back," they say, "the Inland Revenue Authorities held that, as the agreements in question were agreements relating to the sale of goods, they were exempt from stamp duty; and this decision has again been formally and officially confirmed by the Inland Revenue Authorities since the decision of Mr. Commissioner Kerr."

The Proposed Supply of Water Gas in Dublin.—We referred in the "JOURNAL" for the 19th ult. to the scare which some of the Dublin papers are trying to get up on the question of the proposed supply of water gas in the city, and expressed the opinion that the articles bore strong evidence of having been inspired. Little notice seems to have been taken of them—at all events of the one in the "Daily Independent;" for that paper came out with another article on the day our reference to the matter appeared. Whoever inspired the effusion alluded to led the writer sadly astray on many points; and therefore Mr. W. F. Cotton, the Managing-Director of the Alliance Gas Company, very promptly set him right. One of the accusations made against the Company was that they had not satisfied the Corporation as to their plans; but Mr. Cotton demolishes this by stating that they did so three weeks since. He acknowledges that, at the request of the Gas Committee, they paused in their work but when the true facts, which had previously been withheld, were put before them, they withdrew their opposition. No doubt the writer of the article thought he could score a point by referring to Massachusetts and the conditions under which water gas is supplied in that State. But, unfortunately, his informant had primed him with a bit of ancient history, inasmuch as the law which was passed restricting the percentage of carbon monoxide in water gas was repealed. The "Independent" professes to "have no desire to be hostile towards the Gas Company." Mr. Cotton is quite sure this is so; but he cannot say so much of that paper's informant, "of whose hostility to the Company the public have," he says, "had ample evidence."

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Dorking Gas Company.—The half-yearly meeting of this Company was held last Tuesday—Mr. W. T. Butler presiding. The Directors reported an increase of 12·02 per cent. in the sale of gas in the six months ending June 30, due to additional consumers and to the extended use of gas in place of solid fuel. They expressed their pleasure in informing the shareholders that the Dorking District Council had accepted the Company's offer for lighting the streets in their district by Welsbach incandescent burners, and had entered into a contract for five years. The revenue in the half year had been £3401; the expenditure, £2226. The amount available for distribution was £2545; and the Directors recommended the payment of the maximum dividends on all classes of shares. This would absorb £981, and leave a balance of £1564 to be carried forward. The report was adopted, and dividends at the rates of 10 and 7 per cent. per annum were declared.

The Bahia Gas Contract.—The "Financial News" has been getting a little amusement out of the very prosaic subject of a gas contract; the one in question being that drawn up by the Bahia Municipality. Our contemporary advises them, when they next decide to place their proposals before the British public, to engage the services of a competent translator, even if they have to spend a guinea (!) to secure them. He goes on to say: "The lot of the contractor who ultimately secures the contract for 'illuminating the city of Bahia' will not be a happy one. The Municipality reserves the right of authorizing for trial any canalizations required for 'experiences.' The contractor has to buy all the existing material, apparatus, works, and accessories under certain conditions. He must replace the 'actual lamps by others of a pattern at the choice of the Municipality;' and what the choice of a South American Municipality may mean, people with experience in that part of the world know only too well. 'Never,' says the law emphatically—'never will the Municipality be responsible for private consumption.' Whether the emphatic position of the word 'never' is intentional or only a blunder of the translator, we cannot tell. All we say is: Perish the thought that it should be responsible for this or for anything else. As for the actual operation of the lighting plant, the meters are to be 'replaced by the contractor once they do not act properly.' The rent is to be stipulated by the contractor, and 'approved by the Municipality'; and the approval will probably be given after innumerable formalities, which the unfortunate contractor might discover were by no means free of official or unofficial expense. The contractor will be liable to a fine for every public burner which is found unlit or giving a dull light during the illumination hours, even if some evil-disposed person has wilfully turned the lights out. At least, this is what the clause clearly means; for there is not a word to limit his liability in this respect to the failures of the light which arise from his own wilful neglect or that of his servants. Finally, 'the contractor is the only responsible party for losses or damages that may result from the canalization and make or from any other work under his charge.' What this means we do not clearly understand; but, as regards the law, we understand it and the disposition of South American Municipalities well enough to be sceptical with regard to the willingness of any British capitalist to jeopardize his money in such an enterprise as this."

Improvement in the Bradford Water Supply.—The improvement in the storage of the high-level reservoirs of the Bradford Corporation, as the result of the recent frequent showers, has enabled the Water Committee to lengthen the hours of supply to twelve—from six a.m. to six p.m. This welcomed change commenced last Thursday.

The Derwent Joint Water Board.—The Leicester Town Council have appointed Alderman Wood, Chairman of the Water Committee, Alderman Vincent, Alderman Coleman, and Mr. Biggs to represent Leicester on the Derwent Water Board. These gentlemen constituted the Sub-Committee who conducted the negotiations at Westminster; and they have been awarded a special vote of thanks for their services.

The Conditions of Labour in the Pipe-Laying Department of the Leeds Gas-Works.—The Gas Committee of the Leeds Corporation had before them last Wednesday the reply of the pipelayers to the proposal of the Committee regarding the hours of work. The men, through the Gas-Workers' Union, had asked for an eight-hour day. This was conceded, on condition that they commenced work at the head-quarters of the department in Dewsbury Road, or elsewhere, as might be required, at 7.45 a.m. The men's letter, submitted to the Committee on Wednesday, agreed to accept this condition for a period of three months, during which they would be able to judge whether it was a satisfactory arrangement or not; but they stipulated that it should apply to head-quarters only, and not to "elsewhere." The Committee, having considered the matter, passed a resolution to the effect that, as the men wished to make a trial of the arrangement for three months, there was no reason why they should not meanwhile see how it worked in relation to other starting-places than head-quarters. In other words, it was decided to adhere to the Committee's proposal. It is thought probable that the men will give the Committee's proposal a trial for three months.

The East Dereham Gas Scandal.—At a special meeting of the East Dereham District Council recently held by requisition, Mr. Hill sought to re-open the question of the defalcations of the late Gas Manager, and to institute an inquiry into the financial condition of the undertaking. He moved: "That an independent investigation be made into the accounts of the new gas-works since they were started." Mr. Lyth seconded the motion. The proposal was ridiculed; the suggested inquiry being characterized as a superfluous waste of time and money, and a slur upon the Local Government Board Auditor. The Clerk made a long statement, in which he recapitulated the proceedings in connection with the prosecution of Drage and the subsequent withdrawal of the charge against him. He said the object of the mover of the resolution was plainly to throw suspicion on the officers; but as the accuracy of the accounts had been questioned, he hoped the inquiry would be granted. On the motion being put, the numbers were equal for and against it; and the Chairman (Mr. Merry, the Vice-Chairman of the Board) refused to give his casting vote. In the course of the proceedings, it was stated that out of the profits of the gas-works there had been paid the interest on the loans and the cost of the improvements carried out (about £3000); and there remained an accumulated balance of £2500. The inference drawn from this was that the undertaking could not be in a very bad way.

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Gas Workers' Grievances at Halifax.—Last Tuesday, the Gas Workers and General Labourers' Union presented the following memorial, accompanied by 1308 signatures, to the Mayor of Halifax (Mr. Simpson): "We, the undersigned ratepayers of the County Borough of Halifax, respectfully request that a town's meeting be convened at an early date for the purpose of considering the attitude adopted by the County Borough Council and the Gas Committee with respect to (1) the agreement recently introduced for signature at the gas-works; (2) the recognition of the Employees' Union as the legitimate instrument for and by which the grievances and requests of such employees shall be expressed and presented; and to pass resolutions upon these matters." The Mayor, however, could not see his way to grant the request, because only one particular trade, and not the community at large, was affected. It was pointed out that if this were granted every section of the municipal workers would go in for town's meetings being called. An additional reason was that, in calling such a meeting they would not get a representative gathering, as it would be packed with workers, who could thus get a majority; and the result would be sent forth as the decision of a town's meeting, when really only one section of the people would be represented.

Bude and Stratton Water Supply.—As the result of long deliberation and much indecision, the Stratton Rural District Council have at last decided upon a scheme for a supply of water for Bude and Stratton. Some time ago, the Local Government Board considered it necessary to call the Council to a sense of their duty in the matter by issuing a writ of *mandamus* against them; with the result that certain negotiations were re-opened, and a scheme was decided upon which formed the subject of an inqury last Wednesday by Major-General Crozier and Dr. Buchanan, Inspectors of the Local Government Board. It is proposed to take the water from a point on the Bude Canal and Harbour Company's property known as Veiland Plane. The canal is not now used for purposes of navigation. The canal reservoir, which the proposed supply would tap, will hold 200 million gallons of water. Filtering-beds and a service reservoir are to be constructed, and the whole cost of the scheme, which has been prepared by Mr. Baldwin Latham, is estimated to be £9500, for which borrowing powers are asked. Mr. Roberts, solicitor, representing the Canal Company, said they disputed the right of the Local Authority to take water from the canal, as suggested in the scheme. The Council are acting under an agreement made in 1891, one of the clauses in which provides that the Company shall supply pure water in a regular and continuous flow from the canal at Hobbacot Down—which was then proposed as the immediate source of supply—"or from such other parts of the canal situated at the same or a higher level." The Hobbacot Down scheme was rejected by the Local Government Board because of doubts as to the purity of the water; and Veiland Plane is at a higher level. Friction has, however, arisen between the Council and the Canal Company, in consequence of the failure of negotiations for the sale of the canal undertaking. The sale was in a fair way to be concluded, subject to the sanction of Parliament, when the Council were advised that they could not buy the undertaking, and that the agreement of 1891 was still in force.

Padstow Water Supply.—It has been decided to proceed with a water scheme for Padstow, the cost of which is estimated at £3500. Moderate as this amount appears, it will involve a rate of 1s. 6d. or 1s. 7d. in the pound.

Wilsons and Mathiesons, Limited.—The statutory meeting of this Company, the formation of which was announced in the "Journal," was held last Tuesday, at the Offices of Messrs. Beevers and Adgie, Accountants, Leeds—Mr. C. C. Wilson presiding. It was stated that £35,000 of 4½ per cent. debenture stock and £30,000 of 5 per cent. preference shares had been issued, and that these had been largely over applied for. All the ordinary shares had been taken by the vendors, with the exception of £3716, which had been secured by the employees as an investment for their savings. The Company had obtained a quotation on the Leeds Stock Exchange for their debenture stock and preference shares; £100 of the former being now quoted at £102 to £104, and the £5 cumulative preference shares at 5¼ to 5½ each. We learn that the combined businesses have already felt the benefit of amalgamation; the sales during the past eight months showing an increase of 25 per cent. upon the corresponding period of last year. Owing to the largely increased demand both in the gas-stove department and in the general trade, the Directors have been compelled to consider a scheme for the extension and re-arrangement of a portion of the ironfoundry department.

Queenstown Gas Company.—The half-yearly general meeting of this Company was held last Tuesday—Lieut.-Col. Curry, J.P., in the chair. The report of the Directors showed that the gross revenue in the six months ending June 30 was £2122, and the expenditure £1338; the net balance available for distribution being £849. Out of this they recommended the payment of dividends at the rates of 10, 5, and 7 per cent. per annum, which would absorb £623, and leave £226 to be carried forward. This is to be applied in meeting the expense of improvements of the works now in progress. In moving the adoption of the report, the Chairman remarked that at the recent meeting of the North of Ireland Association of Gas Managers in Dublin, it was stated that out of 80 towns in Ireland, 61 charged 5s. and upwards per 1000 cubic feet of gas, 40 charged 5s. 6d. or more, 30 charged 6s. or more, and 14 charged 7s. or more. The Queenstown prices would compare very favourably with those of the towns in question. He had noticed at the various half-yearly meetings of shareholders the alarm caused by the greatly increased price of coals and freights from Newcastle; and he feared the Company would have to pay at least 3s. increase per ton on some 1900 tons, which was about the quantity carbonized in the past year. Many local authorities had of late purchased gas companies' undertakings, with the view of working them at a profit to reduce the rates. He would be in favour of amalgamation with the city and other towns not far distant—in short, co-operation—to effect economy in working. The Company were about to have competition from an electric light undertaking; and the Directors had been called upon to tender for a decreased area of public lighting. The report was adopted. On the accounts being submitted, Mr. Buckley proposed the adjournment of the meeting for a week; but on being put to the vote, this was lost by a large majority. The accounts were then passed.

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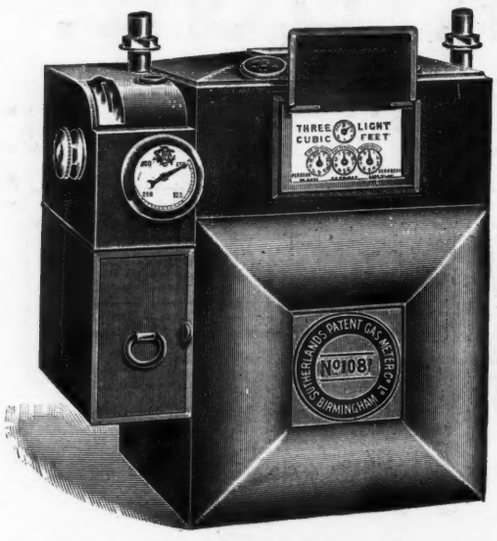

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Willesborough Water Supply.—Major-General H. D. Crozier, R.E., lately held an inquiry, on behalf of the Local Government Board, at East Ashford, with respect to an application for sanction to obtain a loan of £11,000 for the public water supply of Willesborough. Dr. Robinson (Medical Officer of Health), Mr. H. Hamilton (Clerk to the District Council), Mr. J. Hill (Clerk to the Parish Council), and Mr. Bailey Denton (Engineer) were present. At the outset, Mr. Hamilton stated that the population of the parish was 4200; and the assessable value was £10,902. Dr. Robinson said the death-rate for the past twelve years had averaged 13·5 per 1000. Enteric fever was prevalent in 1897, and scarlet fever in 1898. These outbreaks were due to contamination and insufficiency of the water supply. Mr. Bailey Denton stated that he had looked to the lower greensand beds for water, which he knew was good. He had selected a site at Plumpton for boring, and had gone through the Folkestone and Sandgate beds into the Hythe bed for the water. On arriving at a depth of 170 feet, the water came in so fast that he thought it advisable to cease boring. The water then rose to within 25 feet of the surface; stopping at this height. He had no doubt they could pump 200,000 gallons per day. The inquiry shortly afterwards closed; and the Inspector paid a visit to the site of the proposed works.

Local Authorities and the Protection of Sources of Water Supply—At a recent meeting of the Worksop Urban District Council, the question of the powers of Local Authorities over the natural water supplies in their respective districts gave rise to some discussion. It arose from the receipt of the circular of the County Councils Association, already noticed (p. 714), which was read by the Clerk. Mr. White mentioned the matter of the sinking of pits and local supplies of water being materially affected thereby, and instanced the shaft now being sunk by the Wigan Coal and Iron Company at Manton, a small hamlet about a mile from Worksop. He said the effect of this was that, having struck the natural springs of the district, a quantity of water, estimated at 3 million gallons per day, was running to waste, while the wells of the district were greatly affected, some being absolutely dried up. In such cases the Association urged the necessity of immediate legislation, which will confer upon Local Authorities such powers as will enable them to safeguard their supplies of water. Mr. White said it was a matter of which they certainly ought to take notice, and support the Association. The case mentioned in the circular was one within their own parish; and he was very sorry indeed that they had no powers. He used to be under the impression that Local Authorities had power to prevent the natural water supply of a district being wasted; but the evidence given in connection with the Derwent Water Bill proved that this was not so. Something like 3 million gallons of water per day were running to waste at Manton; and if this continued, Worksop would, in a few years, be without water. If anything could be done by the Association, or anyone else, it should be done. He moved that the Clerk be instructed to write assuring the Association of the Council's support. After some conversation, this was agreed to; and, in addition, the matter was referred to a Committee.

The Recent Drought and the Water Supply.—It will doubtless be remembered that Bradford and Lancaster were two of the towns which were seriously affected by the late severe drought; and curtailment of the water supply had to be resorted to in each case. At Bradford the full supply was restored on Saturday; while Lancaster has been enjoying it since the 22nd ult. In the week ending the 27th ult., Lancaster had nearly 14½ million gallons of water in store; and last Thursday the Bradford high-level reservoirs contained 120 million, and the low-level ones 600 million gallons.

Warrington Corporation Gas Supply.—The Gas Engineer of the Warrington Corporation has just submitted to the Gas Committee a report on the work of the past year. In the course thereof, he states that the reduction of 3d. per 1000 cubic feet in the charge for gas on the past six months reduced the revenue by about £1600. The receipts from gas during the year rose about £1000 owing to the larger quantity sold. The abnormal advances in the price of coal and other material will increase next year's expenditure to the extent of £3000 or £4000. If the present prices of residual products are maintained, the income from their sale is estimated to raise the receipts from £700 to £1000. The increased make of gas was 19,588,700 cubic feet, or 6·94 per cent.

Okehampton Water Supply.—A scheme for the improvement of the water supply was under the consideration of the Okehampton Town Council yesterday week. The Surveyor (Mr. J. A. Lucas) reported that the present reservoir had a storage capacity of 126,300 gallons, or rather more than two days' supply. There was little or no margin in case of accident to the pipes or of fire, drought, or frost. He recommended that steps should be taken to carry out the works for obtaining an additional supply from the stream known as Reddaven, and that a bye-pass should be made by which the new supply could, in case of necessity, be turned direct into the mains of the town. The Council rejected motions for delaying the scheme and for the consideration of alternative proposals, and decided that steps should be taken to get the necessary land and way-leaves.

Reduction in Water Charges and Free Baths at Hull.—At a special meeting of the Hull Corporation Water Committee last Friday, the Chairman (Alderman Massey) said he and the Deputy-Chairman and the Engineer had been drafting a report on the water charges. They thought the Committee might make a departure as to the general tariff on which they were charging all consumers of water. He suggested that they should deal first with the bath question; and he proposed to sweep away entirely the charge for baths in private houses. He moved the following reductions, to commence at the beginning of the next financial year: All water to be charged by meter 6d. per 1000 gallons, which would reduce the income by £1100; 25 per cent. reduction off the charges on combined houses and shops, £1070; 25 per cent. reduction on the charges for lock-up shops and offices, £360; 25 per cent. off extra closets used in shops, offices, and trade, £115; and the freeing of baths in private houses, £1775. These charges, Alderman Massey informed the Committee, represented an immediate easement of £4420 per annum. The Committee agreed to the whole of the proposals of the Sub-Committee.

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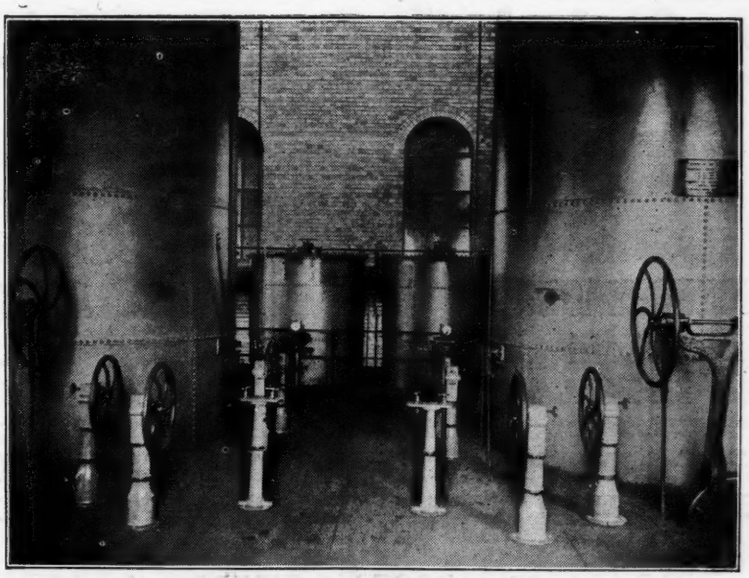

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A Water-Supply Project for Bolton.—Under the instructions of the Bolton Corporation, extensive surveys and experimental borings are being carried out, with a view to obtaining a new water supply from the head waters of the River Hodder, the principal tributary of the Ribble. This watershed already supplies the needs of Preston, from Langden and Haredon brooks, and of Blackburn, from the Whitendale and Brennan streams. The Bolton project is to take a supply from the head waters of the Hodder itself, either at Croasdale Beck or Barughyll Beck.

Damage to Electric Lighting Plant and Water-Pipes by Earthquake in India.—On the night of Monday last week, a succession of earthquake shocks occurred in Darjeeling, involving much loss of life and great damage to property. The shocks were accompanied by a remarkable rainfall, and were followed by terrible landslips. In 24 hours upwards of 20 inches of rain fell; and in all 28 inches fell in 38 hours. The electric light plant was damaged, and the town thrown into darkness; and 3000 feet of water-pipe is lost. Drinking water was scarce, as all the channels were running liquid mud.

Incandescent Gas Lighting for Deptford.—At the meeting of the Greenwich Board of Works last Wednesday, Mr. W. R. Smith reported that the negotiations between the St. Paul's, Deptford, Committee and the South Metropolitan Gas Company, respecting the lighting of the public lamps by the Welsbach system, had resulted in the Secretary of the Company stating that they were ready to fit up 1098 No. 2 burners, 195 No. 4 burners, and 21 No. 4 burners in pairs to 21 lamps, at the inclusive charge of 16s. 6d. and 17s. 10d. per burner, the annual charge for the same to be £2 10s. and £3 6s. respectively, but that the Directors were prepared to supply any number of the "Paris" lanterns in certain specified thoroughfares at an additional charge of £1 12s. 2d. per lamp. The change would effect a saving of about £870 per annum, which in about two years would pay the cost of the installation. The Board decided to request the Company to carry out the work on the terms mentioned.

Polluting a Stream by Gas Liquor.—At the Kingsbridge Petty Sessions, yesterday week, Samuel Ford, employed by the South Hams Gas Company, was summoned, at the instance of the Devon Sea Fisheries Committee, for discharging gas liquor into a drain leading directly into the river which ran into the sea; thus injuring and poisoning the fish. Mr. Ford, for the prosecution, said that in April, 1897, the attention of the Manager of the gas-works was called to a complaint that foul water from the works had been discharged into the drain, and a promise was made that it should not recur. It had, however, been done again recently. The maximum penalty was £20. Evidence was given by a constable to the effect that he received several complaints of the nuisance at different times, and saw defendant roll a heavy cask and deposit the contents—between 40 and 50 gallons—in the drain at one o'clock in the morning. Mr. Beer, for the Company, took the responsibility of the offence. He said it was not true that it was perpetually happening; but on the occasion in question there was considerable difficulty in getting rid of the liquor. He promised that the trouble should not occur again. The Bench inflicted a fine of £4, including costs.

Rugby Water Supply.—The Local Government Board have sanctioned the borrowing by the Rugby District Council of £3400 and £200 for water-supply purposes. The former sum is required for the purchase of land, and the latter for the laying of new mains.

Additional Gas-Works for Blackburn.—The Blackburn Corporation having made application to the Local Government Board for sanction to the borrowing of £60,000 for the construction of new gas-works, Colonel Langton Coke, one of the Inspectors, held an inquiry there last Wednesday. At the opening of the proceedings, the Town Clerk (Mr. R. E. Fox) said it would be necessary, with the approval of the Inspector, to increase the sum required by £10,000, in order to meet the rising price of iron and other materials required. Part of this additional sum, he added, was designed to cover the cost of acquiring a piece of land separating the site of the new gas-works at Greenbank from the canal. This will secure the advantage of having a railway on one side of the new works and the canal on the other for the delivery of coal, &c. It is also proposed to construct a siding from the Lancashire and Yorkshire Railway Company's line, so that the coal-trucks can be brought right into the works. Evidence was given as to the proposed new establishment, and also as to the estimates, and the Inspector afterwards visited the place.

Messrs. Biggs, Wall, and Co., have received from the Kidderminster Gas Company an order to erect two of their "Rapid" retort-charging machines.

The Chesterfield Gas and Water Board have accepted the tender of Messrs. R. Dempster and Sons, Limited, of Elland, for four 25-feet square purifiers, with foundations, connections, &c., for their works.

Under the auspices of the Morpeth Gas Company, an exhibition of domestic gas cooking and heating appliances manufactured by Messrs. Fletcher, Russell, and Co., Limited, was opened in that town last Tuesday. Miss Young was entrusted with the lectures on cookery.

Messrs. D. Hulett and Co., Limited, have issued a revised catalogue of their outside lamps suitable for incandescent gas and governor burners or oil-lamps. There is an excellent collection of lanterns, as well as a variety of well-designed lamp-columns, brackets, cradles, dwarf lamp-pillars, &c.

Owing to the development of their business, the Anti-Vibration Incandescent Lighting Company, Limited, have had larger and more suitable premises built; and they entered into occupancy of them on Monday last week. The works and head offices are at 35, Kirkstall Road, Leeds; and branches have been opened in London, Manchester, Birmingham, and Bradford.

The employees of Messrs. Thomas Glover and Co., Limited, 69 and 71, M'Alpine Street, Glasgow, were entertained to dinner in the Royal Restaurant, Glasgow, on Saturday, the 23rd ult., to inaugurate the opening of the new gas-meter factory recently opened by the firm in the city, as mentioned in the "JOURNAL" last week. A pleasant evening was spent, and speeches were made by Mr. Main, one of the Directors, and others, expressing the hope that this inauguration of a new industry in Glasgow would meet with every success.

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SELF-SEALING RETORT-MOUTHPIECES. LIFTING APPARATUS. CENTRE & FOUR-WAY VALVES.

MAKERS OF WECK'S PATENT CENTRE-VALVE.

TAR-DISTILLING PLANT. CONDENSERS. WOOD SIEVES.

TAR-BURNERS. ROOFS. GIRDERS, &c., &c.

Makers of Cripps' Patent Grid Valve and Hydraulic Main Valve.
Makers of Holgate's Patent Gas-Purifying Plant.
Makers of Tysoe's Patent Self-Sealing Mouthpiece.

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Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications re Oxide to the Company as above.

WINKLEMANN'S ORIGINAL "VOLCANIC" FIRE CEMENT and "VOLCUM" PASTE. Always ready for use in GAS-WORKS. Resists 4500° Fahr.

ANDREW STEPHENSON,
182, Palmerston Buildings,
Old Broad Street, E.C.
"Volcanism, London."

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS. Correspondence invited.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER, LINCOLN."
[For Illustrated Advertisement, see p. 842.]

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SHEFFIELD CHEMICAL COMPANY, LIMITED.
BUYERS of Spent Oxide. Sellers of OXIDE OF IRON and SULPHURIC ACID.

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Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.
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70, CHANCERY LANE, LONDON, W.C.

SPENT OXIDE wanted.
BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

NEW GAS PLANT CEMENT.
JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

PRACTICAL RETORT SETTERS.
BATES & NUTTALL, 32, Havelock Road, Saltley, Birmingham.
Regenerator or other Furnaces erected to Engineers' own Designs. Best Work Guaranteed. Please write for Estimates.

MELROSE CYCLES
SHOULD be bought by Gas and Water Officials. Ladies' No. 1, £10 10s.; No. 2, £8 10s. Gents' No. 1, £10; No. 2, £8. Highest Quality. Twelve Months' Guaranty. Sent on approval. Catalogue free. MELROSE CYCLE COMPANY, COVENTRY.

SULPHURIC ACID for Sale.
BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

BENZOL, specially made for the Enrichment of Gas.
ELLISON AND MITCHELL, LIMITED, Kilnhurst, near ROTHERHAM.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

SULPHURIC ACID.
JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

GAS TAR wanted.
BROTHERTON AND CO., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GLOBE Chemical Works, Marple, near Manchester, Sell the most reliable and best OXIDE OF IRON for Purifying Gas. Purity and Quality guaranteed
Sellers of the best RETORT CEMENT. Best Price given for SPENT OXIDE.

IRON OXIDE (Bog Ore), best quality, for the Purification of Gas, containing up to 85 per cent. Hydrated Oxide of Iron, and absorbing while being used a high percentage of Blue.
S. BOWLEY AND SON, Wellington Works, Battersea Bridge, LONDON, S.W.

ADVERTISER seeks position as COLLECTOR or CLERK and COLLECTOR to Gas or Water Company. Thorough knowledge of Office routine and Secretarial work. Highest References.
Address No. 3334, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, an Engagement by the Advertiser, a GAS MANAGER, with extensive Home and Colonial experience, who will be disengaged in the early part of the month of October. Well up in all the details of modern Gas-Works Construction and its Management, and the most approved Appliances introduced to economize the production of Gas and extend its use. Practically acquainted with both American and German Carburetted Water-Gas Plant and its manipulation. A good Draughtsman and Accountant. Satisfactory References and Testimonials.
Address No. 3332, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, immediately, a competent GAS-FITTER, used to House Work. Iron, Compo., &c. State Age and Experience. Wages 30s. Permanency.
Apply to R. WATSON, Gas-Works. HERTFORD.

WANTED, an Under Man for Charging, Purifying, and to make himself generally useful in a small Gas-Works. Wages 24s. per week.
Apply, by letter, with *copies* of Testimonials, to Mr. JAMES COWNEY, Gas-Works, Seaford, SUSSEX.

WANTED, a Draughtsman, accustomed to Retort-Settings and general Gas-Works Plant. Salary 45s.
State Age and Experience to the LEEDS FIRE-CLAY COMPANY, LIMITED, Engineering Department, Wortley, LEEDS.

WANTED, a Manager (Working) for small, single-handed, Country Gas-Works £50 to £60, with House and Coal.
Apply, by letter, stating Age, Experience, &c., to No. 3355, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Suburban Gas Company, three SERVICE LAYERS. Constant employment for competent Men. Good Wages.
Apply, by letter, stating Qualifications, Wages required, &c., to No. 3354, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

HIGH WYCOMBE GASLIGHT AND COKE COMPANY, LIMITED.
WANTED, by the above-named Company, a steady reliable HEAD STOKER, capable of looking after Engines, Boilers, Exhausters, &c., and Regenerative Settings. None but those fully qualified and absolutely steady need apply. Married Man preferred. Wages £1 11s. 6d. per week.
Applications to the undersigned.
J. FRED. WICKS, C.E.,
Engineer and Secretary.

SEASON 1899.
BALE'S OXIDE OF IRON, of finest Quality. Summer delivery specially recommended for efficiency and economy.
FIRE CEMENT, PAINT, and CHEMICALS.
120 and 121, NEWGATE STREET, LONDON, E.C.

SADLER & CO., Ltd., Middlesbrough, Tar Distillers and Tar Colour Manufacturers. BENZOL specially prepared for Gas Enrichment free from Sulphur. Pure Hydrated OXIDE OF IRON for Purifying Gas either for Sale or Lent on Hire. Always Buyers of GAS TAR and AMMONIACAL LIQUOR.

CANNEL, COAL, ETC.
JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 30, ST. ANDREW SQUARE, EDINBURGH, or NEWTON GRANGE, NEWBATTLE, DALKEITH, SCOTLAND.

WANTED, at once, a Draughtsman, well up in Constructional Ironwork.
Apply to W. J. JENKINS AND CO., LIMITED, RETFORD.

WANTED, a competent Gas-Stoker (Shovel Charging). Permanent Situation to a steady, active Man. Wages 24s. in Summer, 25s. in Winter Months, and Bonus.
Apply to ROBERT FISH, Engineer and Lessee, Gas-Works, East Cowes, ISLE OF WIGHT.

WANTED, a leading Stoker, to take charge of a small Gas-Works under Manager. Must be capable of acting without supervision, and thoroughly understand the working of Gas-Engine and Exhauster. Salary 35s. per week.
Applications, with Testimonials, to the MANAGER, Gas-Works, CHESTER-LE-STREET.

GAS-FITTERS.
THE Chester United Gas Company have Vacancies for one or two GAS-FITTERS. Young Men preferred. Improvers may apply. Employment for a good Man will be constant. Wages to commence 28s. per week.
Apply, in own Handwriting, stating previous Experience and giving References, to the Manager and Engineer, Mr. J. C. BELTON, Gas-Works, CHESTER.

WANTED, immediately, a second-hand GASHOLDER, 600 cubic feet capacity.
Apply, with full Particulars, to INVERNESS WATTS, Secretary, the Denayrouze Light Syndicate, Limited, 28, Victoria Street, WESTMINSTER.

IRON ROOF for Sale, 132 feet long by 53 ft. 4 in. Span, in first-class condition.
Apply to CLAYTON, SON, AND CO., LIMITED, Hunslet, LEEDS.

TOWER Scrubber (5 ft. by 20 ft.) Shell, Wrought Iron, with Flanges, Openings, and Manholes. £35. Bye-Pass and Boards if desired.
Address No. 3352, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ENGINE and Exhausters, 20,000 and 30,000 cubic feet per hour, delivered immediately. Cheap to clear.
J. F. BLAKELEY, Thornhill, DEWSBURY.

CAST Tank, 31 feet diameter, 12 feet deep, £4 15s. per ton. Straps and Bolts included. Five Years old.
J. F. BLAKELEY, Thornhill, DEWSBURY.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

NORMANTON GAS COMPANY.
OFFERS are invited for the following:—
48 ASCENSION-PIPES, 5 inch.
48 BRIDGE-PIPES, 4 inch.
41 DIP-PIPES.
4 Lengths HYDRAULIC MAIN, each 18 ft. long, 20 in. by 19 in. section.
2 CONNECTIONS for Hydraulic Main.
9 STANDARDS for Hydraulic Main.
36 MOUTHPIECES, 18½ in. by 14½ in.
8 SELF-SEALING MOUTHPIECES, 18 in. by 14 in.
80 LUGS.
40 CROSS-BARS and SCREWS.
40 LIDS.
2 DOOR FRAMES (double Doors) complete.
1 WALLER EXHAUSTER and VALVES in excellent condition, 5000 feet per hour.
1 KORTING EXHAUSTER and CONNECTIONS.
Further Particulars may be had from
E. H. HUDSON,
Secretary and Manager.
Gas Offices, Normanton, Yorks.,
Sept. 25, 1899.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

PLYMOUTH AND STONEHOUSE GASLIGHT AND COKE COMPANY.

NEW ISSUE OF CAPITAL.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on

TUESDAY, the 10th of OCTOBER, 1899,

at Two o'clock precisely, in Lots,

£5000 ORDINARY STOCK

OF THE

PLYMOUTH AND STONEHOUSE GASLIGHT AND COKE COMPANY,

ranking for a Standard Dividend of 5 per cent., subject to the Sliding-Scale; the last Dividend having been 6¼ per cent.

Particulars of the SECRETARY of the Company, at the Offices, PLYMOUTH; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

MR. ALFRED RICHARDS will include in the above Sale

£950 "A" STOCK, and

£600 "B" STOCK

in the above Undertaking, and upon which the last Dividends paid were 6 and 4½ per cent. respectively.

Particulars of the AUCTIONEER as above.

Re Mrs. Louisa Baynes, deceased.

REIGATE GAS COMPANY, SUTTON GAS COMPANY, AND NEWHAVEN GAS COMPANY.

MR. ALFRED RICHARDS will include in the above Sale—

£290 STOCK in the REIGATE GAS COMPANY.

80 £10 SHARES and £100 FOUR PER CENT. DEBENTURE in the SUTTON GAS COMPANY, and

74 £10 SHARES in the NEWHAVEN GAS COMPANY.

Particulars of the AUCTIONEER as above.

NORTH MIDDLESEX GAS COMPANY.

Ninety £10 FULLY-PAID SHARES to be sold by Auction, by

MR. ALFRED RICHARDS on the above date.

Particulars of the AUCTIONEER, as above.

SOUTHEND WATER-WORKS COMPANY.

NEW ISSUE OF £9000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

CATERHAM AND DISTRICT GASLIGHT AND COKE COMPANY.

ISSUE OF 250 £10 FIVE PER CENT. PREFERENCE SHARES.

ALDERSHOT GAS AND WATER COMPANY.

NEW ISSUE OF 130 £10 FIVE PER CENT. PREFERENCE SHARES.

MR. ALFRED RICHARDS has received instructions from the Directors of the respective Companies to SELL the above STOCKS and SHARES by Auction at the Mart, E.C., on Tuesday, Oct. 17, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

KING'S LYNN GAS COMPANY, HARROW AND STANMORE GAS COMPANY.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Tuesday, the 17th of October, at Two o'clock precisely, in Lots, Stock and Shares as follows:—

KING'S LYNN GAS COMPANY—£310 ORIGINAL STOCK.

HARROW AND STANMORE GAS COMPANY—80 £10 "A" SHARES and 18 £10 "C" SHARES.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

SOUTHEND GAS COMPANY.

NEW ISSUE OF £5000 ORDINARY STOCK.

GRAYS GAS COMPANY.

NEW ISSUE OF 400 £10 "B" SHARES.

MR. ALFRED RICHARDS has received Instructions from the Directors of the respective Companies to SELL the above STOCK and SHARES BY AUCTION at the Mart, E.C., on Wednesday, Oct. 25, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

BOROUGH OF HEYWOOD.

THE Gas Committee invite Tenders for the supply of WET and DRY GAS-METERS.

Specification and Form of Tender may be obtained from Mr. W. Whatmough, Gas Manager.

Contractors tendering for this work must pay their workpeople at least the Standard or Trade Union Rate of Wages, and observe the Trade Conditions which attach to the various kinds of work for which the Tender is sent in.

Tenders, endorsed "Gas-Meters," to be sent to me not later than Tuesday, Oct. 17, 1899.

By order,

J. H. BALDWICK,
Town Clerk.

Municipal Buildings, Heywood,
Sept. 28, 1899.

COUNTY BOROUGH OF BURNLEY.

(GAS DEPARTMENT.)

THE Gas Committee of the Burnley Corporation are prepared to receive TENDERS for the erection of BUILDINGS and PLANT for the Manufacture of CARBURETTED WATER GAS, as follows:—

1. Excavator, Mason, and Bricklayer.
2. Wrought-Iron Roof.
3. Slater.
4. Cast-Iron Cistern.
5. Steam-Boilers.
6. Engines, Generators, &c., for the manufacture of Carburetted Water Gas.

Specifications, Bills of Quantities, and Forms of Tender may be obtained, on application to the undersigned, on and after Friday, the 6th of October.

Tenders, suitably endorsed, to be sent in, addressed to the Chairman of the Gas Committee, Town Clerk's Office, Burnley, on or before Wednesday, the 18th of October, 1899.

JNO. P. LEATHER.

Gas-Works, Burnley,
Sept. 29, 1899.

BRIGHTON AND HOVE GENERAL GAS COMPANY—£720 ORIGINAL STOCK. Last Dividend 11½ per cent.

SOUTHAMPTON GASLIGHT AND COKE COMPANY—£1100 FIVE PER CENT. ORDINARY STOCK.

WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY—£100 "C" STOCK. Last Dividend 12½ per cent.

MITCHAM AND WIMBLEDON DISTRICT GASLIGHT COMPANY—£200 "A" ORDINARY STOCK. Last Dividend 10 per cent.

MESSRS. EDWIN FOX & BOUSFIELD will include the above STOCKS in their next Stock and Share Auction at the Mart, E.C., on Wednesday, Oct. 18, at Two o'clock, in Lots.

Particulars at the AUCTIONEER'S OFFICE, 99, Gresham Street, BANK, E.C.

Foolscap 4to, pp. 535, with 239 Illustrations and Steel Plate Engraving (as Frontispiece) of WILLIAM MURDOCH, *Inventor of Gas Lighting.*

Morocco Gilt, 21s.; Roan Gilt, 18s.

THE SIXTH (AND CENTENARY) EDITION OF THE

HANDBOOK

FOR

GAS ENGINEERS AND MANAGERS.

BY

THOMAS NEWBIGGING,
M.Inst.C.E.

LONDON:

WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

Do not throw away any more of your

ASHES

OF

INCANDESCENT MANTLES

Buyers are

OBERFELT & CO., BERLIN,

Manufacturers of Incandescent Burners.

NITRATE of Thorium and Cerium. FABRIK CHEMISCHER PRAEPARATE VON STHAMER, NOACK, AND CO., HAMBURG.

ENRICH YOUR GAS

WITH CHEAP

BENZOL.

SPECIALLY PREPARED, FREE FROM SULPHUR.

AT to-day's Price of Benzol, Illuminating POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.

Apply to SADLER & CO., MIDDLESBROUGH.

DISPENSE WITH CANNEL COAL

and

INCREASE YOUR ILLUMINATING POWER

by using the

WHESSOE-MUNICH BENZOL CARBURETTER

The Cheapest and Best in the Market.

The Managers of Tynemouth, Middlesbrough, and Darlington Gas-Works are much pleased with it, and would not be without it.

Apply to the Sole Makers:

THE WHESSOE FOUNDRY COMPANY, LIMITED, DARLINGTON.

PRICE'S COKE & COAL BARROW

effects a great saving of time, labour, and expense.

For Particulars, Price, &c., apply to Mr. EDWARD PRICE, 119, Queen's Road, FINSBURY PARK, N.

Prices are Reduced.

ARMSTRONG'S

PATENT

CANDLE SAFETY LAMPS

Are a great improvement on Oil, giving a good Light, requiring little or no Cleaning, and when once lighted no further attention is necessary. The Candles are made to burn 5, 7, or 9 hours.

43, MANCHESTER STREET, GRAY'S INN ROAD, W.C.

COKE-BREAKERS,

PRICES REDUCED.

(THOMAS & SOMERVILLE'S PATENT)

With Elevators and Conveyors worked by Steam or Gas Engine.

GEORGE WALLER & CO.,

165, QUEEN VICTORIA STREET, E.C.;

And at STROUD, GLOUCESTERSHIRE.

JAMES OAKES & CO.

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

BOWENS' Ltd. Successors,
STOURBRIDGE.

MANUFACTURERS OF
BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.
Established 1860.

HARPER & MOORES,
STOURBRIDGE.

MANUFACTURERS OF
BEST FIRE-BRICKS, GAS-RETORTS,
LUMPS, TILES, AND ALL ARTICLES IN FIRE-CLAY.
Proprietors of Best Glasshouse Pot, Crucible, and other Stourbridge Clays.
Manufacturers of Glasshouse Pots and Crucibles of every kind.
Established 1836.

TROTTER, HAINES, & CORBETT,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
Shipments Promptly and Carefully Executed.

London Office: R. Cull, 34, Old Broad Street, E.C.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.
GAS ENGINEERS' AGENTS AND CONTRACTORS FOR
Meters, Fire-Clay Goods, Oxide of Iron, and all other Gas Apparatus. Retort Carbon purchased.
Inquiries Solicited.
Telegrams: "DARWINIAN, MANCHESTER." Telephone 1806.

BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per Ton. .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

For Prices, &c., apply to
W. H. PARKINSON,
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.

Telegraphic Address: "PARKINSON, NEWCASTLE."

HOLMSIDE
GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . . 11,205 Cubic Feet.
Illuminating Power 16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality) 13¾ Cwt. per Ton.
Sulphur . . . . . A little over 1 per Cent.
Ash . . . . . Under 1 per Cent.
Tar . . . . . 163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor 103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR
PELTON GAS COALS.

Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,
HOLMSIDE & SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD
BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY
RAVENSTHORPE, NEAR DEWSBURY.

THOMAS TURTON
AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
London Office:
90, CANNON STREET, E.C.

THORNLEY GAS COALS
WORKED BY THE
WEARDALE IRON & COAL Co., Ld.
OUT OF THEIR
THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by
Messrs. J. & H. S. PATTINSON.

Yield of Gas per Ton . .	10,500	Cub. Ft.
Illuminating Power . . .	16·9	Candles.
Coke (of good quality) . .	67·5	per Cent.
Sulphur	0·58	,,
Ash	2·73	,,

For Price, &c., apply to the
WEARDALE IRON & COAL Co., Ld.
QUAYSIDE, NEWCASTLE-ON-TYNE.

WELDON MUD
FOR
GAS PURIFICATION,
For use in the
RECOVERY OF SULPHUR,
ALSO
Removal of last Traces of SULPHURETTED HYDROGEN in catch position.

Full Particulars on application to the Patentees:
GAS DESULPHURIZATION CO.,
— LIMITED. —
1, FENCHURCH AVENUE, LONDON, E.C.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH N.B.

LONDONDERRY GAS COALS
FROM THE
MARQUIS OF LONDONDERRY'S COLLIERIES,
COUNTY OF DURHAM.
Available Output up to 5000 Tons per day.
Yield of Gas 11,000 cubic feet per Ton of Coal as per Analysis by
Mr. John Pattinson, F.C.S., F.I.S.

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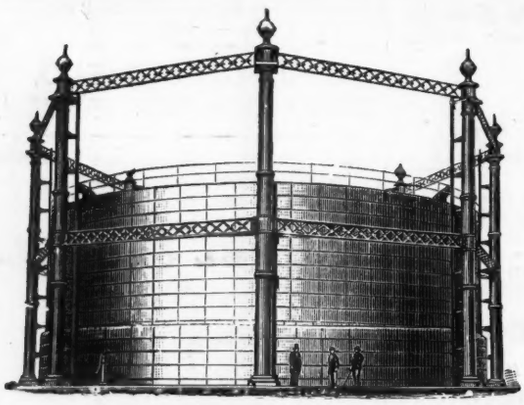

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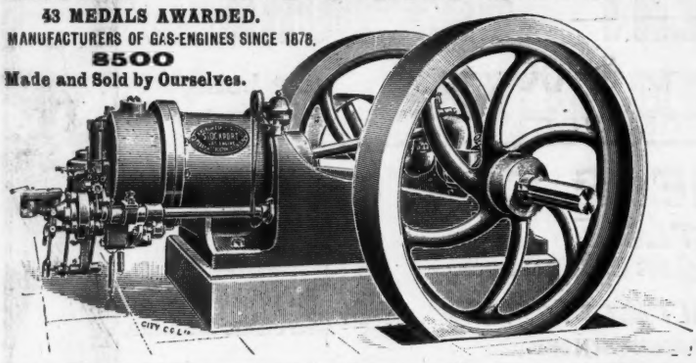

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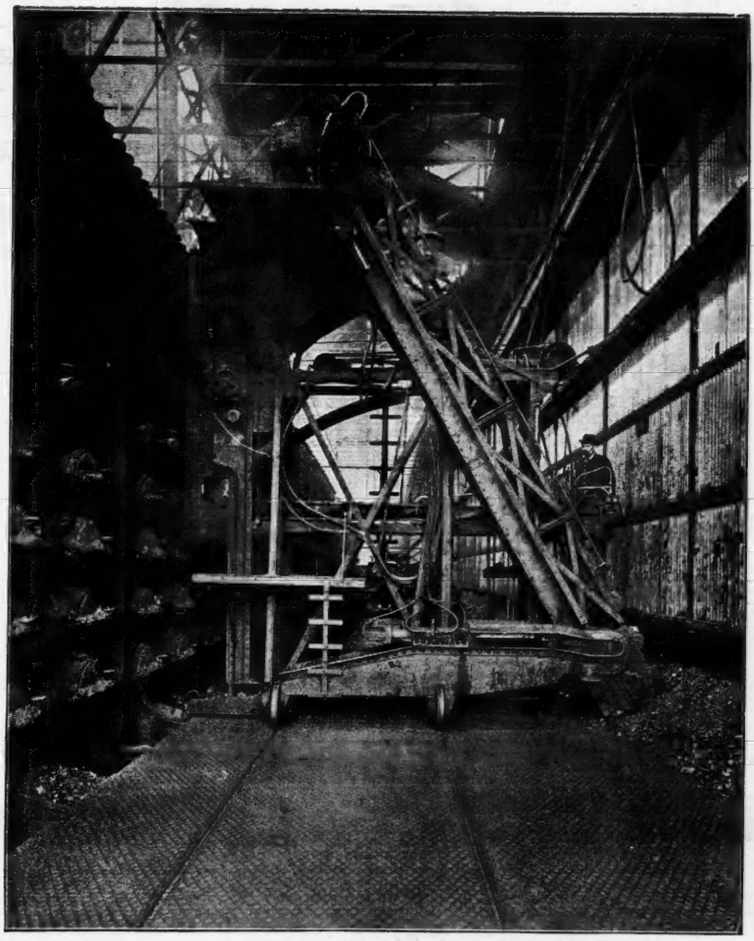

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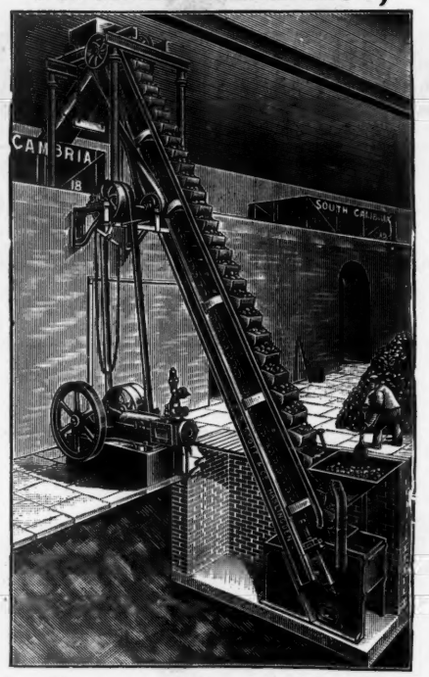

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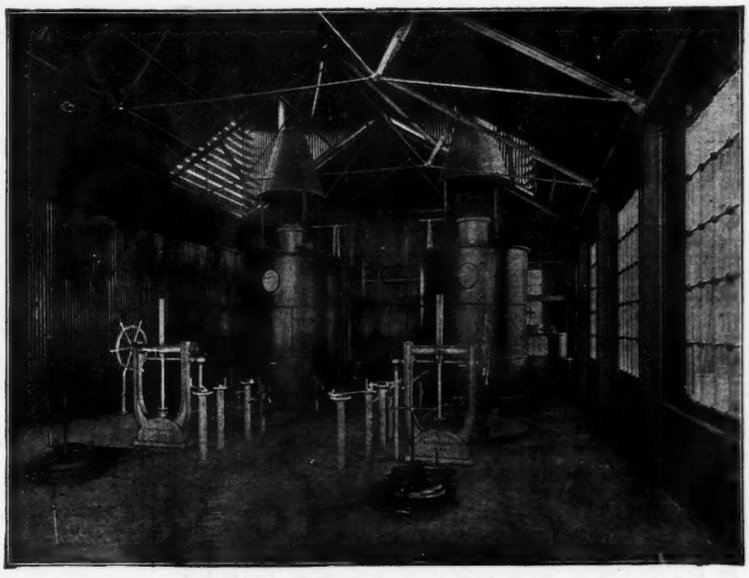

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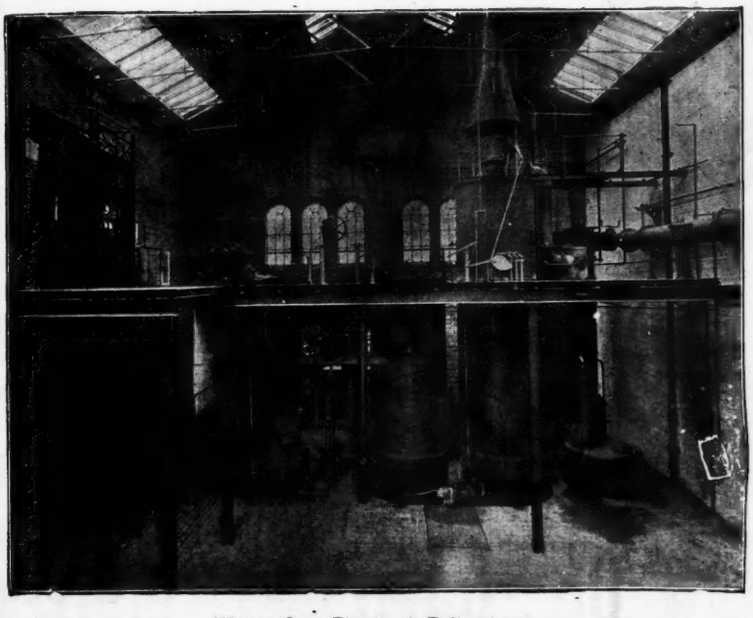

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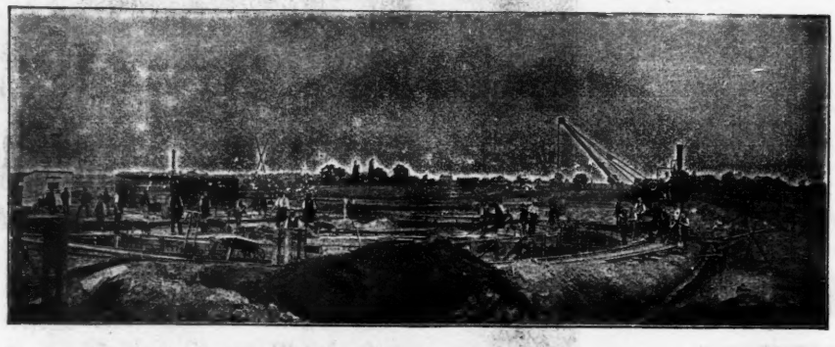

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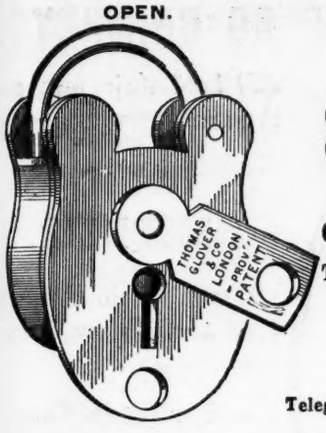

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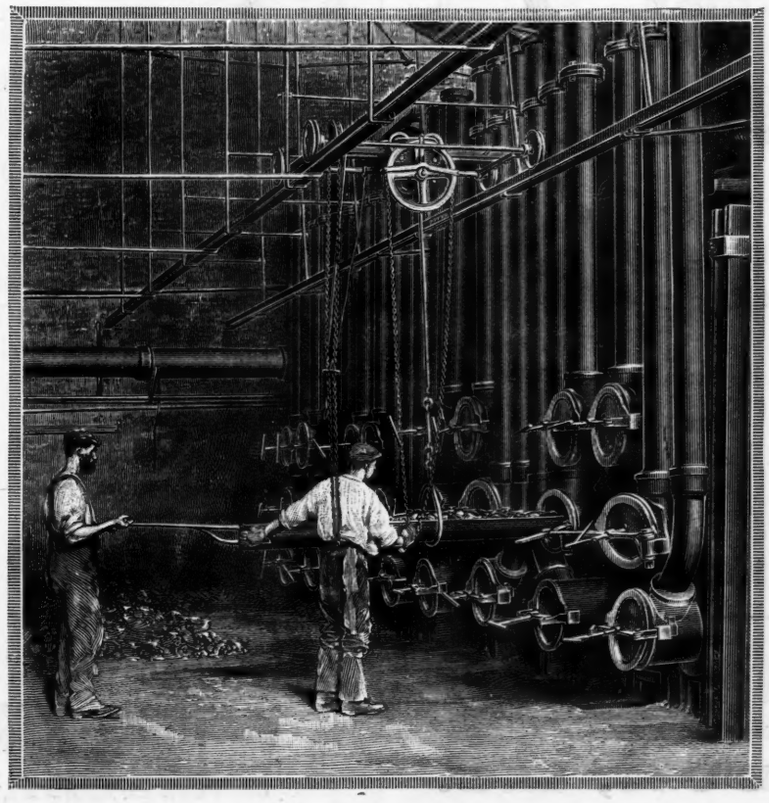

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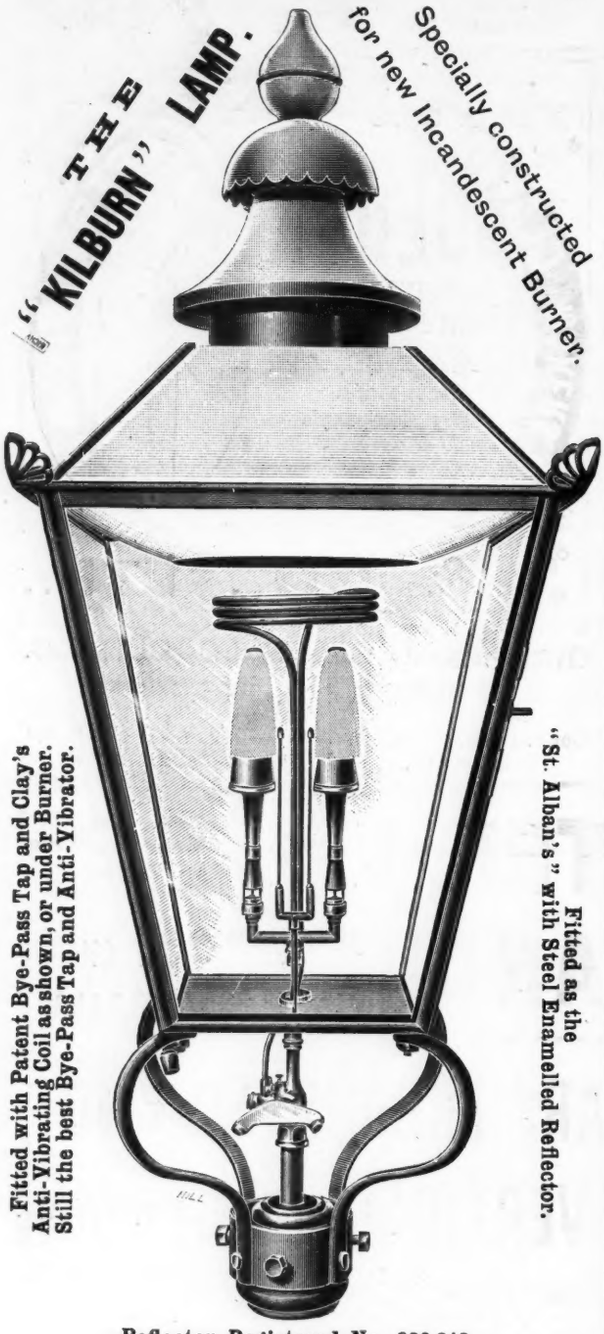

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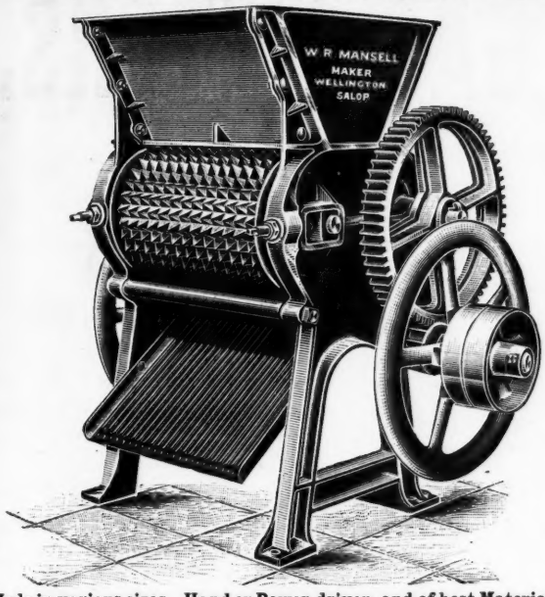

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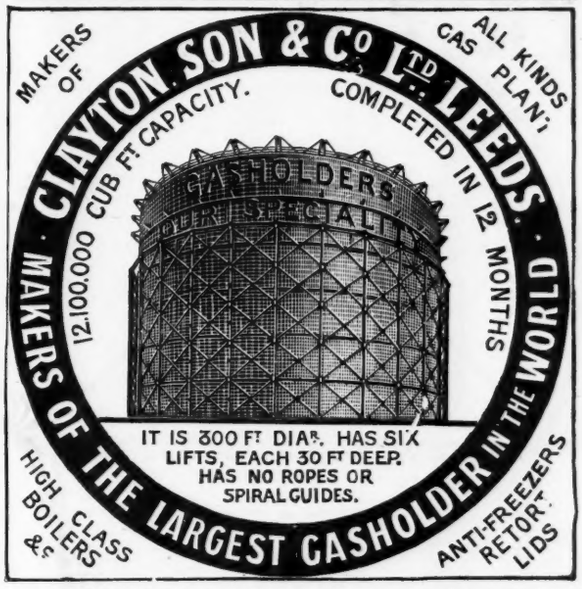
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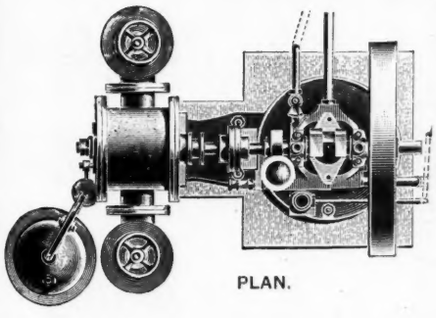

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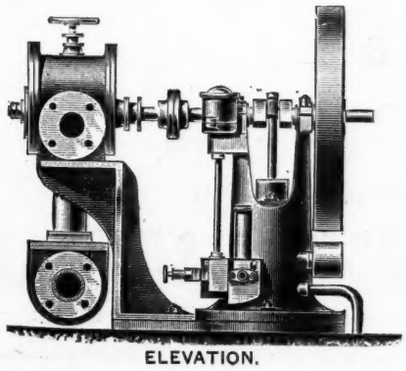

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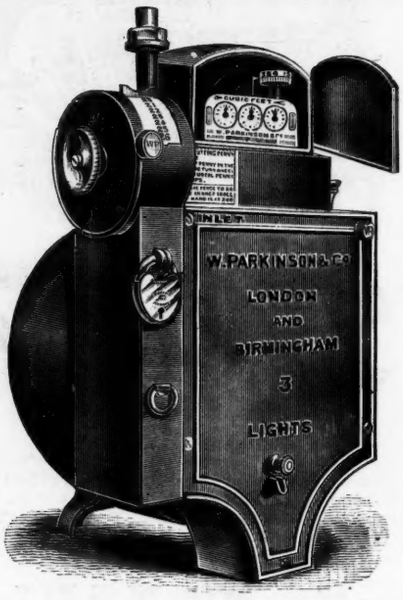

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[See also Advt. p. 808.

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